

A Review Article: Potential Anti-cholesterol of Extract Olive Oil (*Olea europaea* L.)

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Abstract: Dyslipidemia is a risk factor that triggers the emergence of cardiovascular disease, resulting in many deaths worldwide. This review article aims to examine the anti-cholesterol potential of olive oil extract (*Olea europaea* L.). This study is a literature review to explore the anti-cholesterol potential of olive oil extract (*Olea europaea* L.). The results of this literature review show several papers that discuss the pattern of fat consumption much higher than others where subjects experience an increase in HDL levels caused by olive oil extract. In addition, increasing HDL cholesterol levels can reduce LDL and total cholesterol levels in the blood. Therefore, using Olive oil can be recommended as an ingredient to reduce the problem of dyslipidemia.

1 INTRODUCTION

Dyslipidemia is the main factor causing coronary heart disease, the number one contributor to death worldwide. Cardiovascular disease will account for about 25% of deaths by 2020 and is projected to increase, especially in developing countries, including Asia. The death rate due to CHD will reach 1.8 million in 2020, meaning that CHD is a deadly disease in Asia, including Indonesia (WHO, 2020). In Indonesia, the death rate due to CHD reaches 1.25 million people out of the 250 million population. In Indonesia, according to the results of the 2019 Basic Health Research, 1.5% or 15 out of 1,000 Indonesians suffer from coronary heart disease (Kementerian Kesehatan RI, 2018).

Dyslipidemia is a problem of abnormal cholesterol or fat in the blood. Problems Excess cholesterol occurs because people's lifestyles are not very good and far from healthy lifestyles. Smoking and unhealthy lifestyles, such as lack of exercise, are some causes of high cholesterol. Lack of exercise also makes the heart work less optimally in pumping blood throughout the body. In addition, lack of exercise also causes fat accumulation in the body. However, without realizing it, these fats block the path of oxygen in the body and cause the heart to work harder to pump blood and oxygen throughout the body.

Disorders of lipid metabolism characterized by an increase or decrease in the lipid fraction in the plasma are the specific definition of dyslipidemia. The main lipid fraction abnormalities were increased total cholesterol, LDL cholesterol, increased triglyceride levels, and decreased HDL levels. All three play an important role in atherosclerosis and are so closely related that they cannot be discussed separately. These three are known as the lipid triad (Anwari and Sutysna, 2020).

The major lipid fraction abnormalities are those associated with the rise and fall of cholesterol. If the total cholesterol level reaches 250 mg/dl, a person has dyslipidemia. There are many methods of treating dyslipidemia, including chemical drugs, herbal medicines, and dietary modifications. Consuming fruits or vegetables containing flavonoids are recommended in dietary modifications for the treatment of dyslipidemia. Modifying diet and use of herbal medicines also aim to reduce the side effects of using drugs for people with dyslipidemia in the long term. There are lots of herbal ingredients that can be used for various kinds of diseases, including for dyslipidemia itself. Therefore, many researchers are researching herbal ingredients with high antioxidants to help treat dyslipidemia. One example of such an herbal ingredient is Olive oil (Primary, 2019).

Olive oil has many uses, including protecting against coronary artery disease, high blood cholesterol, high blood pressure, diabetes, obesity and some cancers. Olive oil lowers cholesterol levels, which are harmful to the body. Various studies support that olive oil lowers total and harmful cholesterol levels without lowering healthy cholesterol levels, reducing the risk of atherosclerosis. The rich nutrients in olive oil can reduce the adverse effects of dietary fat on blood clotting and the occurrence of thickening of the heart arteries. Olive oil is rich in antioxidants, reaching almost 90%, and olive oil also helps with osteoporosis and increases metabolism.

Many people do not know about the dangers of high cholesterol levels in humans. Many diseases arise due to high cholesterol, one of which is dyslipidaemia, a disease caused by high levels of lipids in the body caused by excess cholesterol in the blood. Thus, we study the effect of olive oil intake on reducing dyslipidaemia to increase public awareness of the dangers of high cholesterol risk. Furthermore, olive oil is one of the foods that are suitable for reducing the risk of dyslipidaemia.

Research on the potential description of olive oil on lipid profile levels in dyslipidaemia still needs a wider study. Therefore, this review article aims at the anti-cholesterol potential of olive oil extract (*Olea europaea* L.). As a basic material for conducting further research on product development with olive oil as raw material from the *Olea europaea* L. plant.

2 METHODS

The research method we use is the Literature Review which reviews several articles that discuss the anti-cholesterol potential of olive oil to treat the problem of dyslipidaemia. The source of the paper from this research is Google Scholar and PubMed, using the keywords "dyslipidaemia" and "olive oil" from 2018 - 2022. From the results of this search engine, we found about 480 papers that match our keywords. In the articles, we adjusted the inclusion and exclusion criteria of our study so that the results of our screening paper are ten articles which we will discuss further in this article. Four national and six international journals were used for this paper's study.

3 RESULTS

This paper uses two types of variables: the independent variable and the dependent variable. The dependent variable is a decrease in the problem of dyslipidaemia which in this paper is associated with olive oil intake. While the independent variables are matters regarding the problem of dyslipidaemia, the time required to use olive oil, how much olive oil should be consumed and a decrease in the number of HDL levels in the blood. This paper also contains research variables in the form of national journals, international journals and expert articles obtained online.

No.	Researcher Name	Year	Method	Results	Conclusion
1.	Mustikyantoro	2020	The method used is literature review from several national and international journals as well as expert articles accessed online.	Consistent intake of olive oil can provide the cardioprotective effects of several important components used for the prevention of cardiovascular disease	Consistent intake of foods with olive oil is required to provide the cardioprotective effects of the various important components in it.
2.	Gunardi and Setiyono	2018	This research is an experimental study with a one group pretest-posttest design without control group design.	Consuming olive oil every day for one week lowers LDL cholesterol oxidation and increases antioxidant compounds, especially phenols in the blood.	There is a direct effect of the use of olive oil on reducing blood cholesterol levels in the elderly group in Posbindu Kenanga RW.13 Pasir Gunung Selatan Village, Cimanggis District, Depok City.

3.	Prater et al.,	2022	The research method used was intervention visits before and after the diet, participants consumed foods high in saturated fatty acids (SFA) (35% daily energy requirements, 47.9% of SAFA), and calorimetry and postprandial were used to measure energy expenditure (EE) and substrate oxidation.	No changes were observed in the act of fasting. The olive oil group had an increase but no difference in substrate oxidation. Meanwhile, in both groups, a lack of metabolic flexibility was found.	The conclusion of this study suggests that consumption of olive oil, in an enriched diet, increases energy expenditure after an occasional high-saturated fatty acid meal, which may improve weight maintenance over time.
4.	Medina-Vera et al.,	2021	The Systematic Review and Meta-Analysis (PRISMA) is a guide to the Selected Reporting Items carried out in this study.	It was found that the mechanisms provided by antioxidant foods to protect individuals with dyslipidemia from associated complications including regulation of lipid homeostasis, antioxidant activity, and anti-inflammatory processes in the sixteen studies reviewed.	Of the total 263 studies conducted. There were significant differences in blood lipids, antioxidant activity, antioxidant enzymes, and oxidative and inflammatory markers shown from the olive oil diet strategy.
5.	Afrianto et al.,	2022	This study uses an experimental study design that is conducted every semester using a one-group pretest-posttest approach, by giving EVOO to women of childbearing age in Kendari City as the independent variable and HDL levels as the dependent variable.	In this study, there were 7 subjects who continued to experience an increase in HDL levels caused by the content of EVOO, namely MUFA and PUFA which played a role in reducing LDL cholesterol levels by inhibiting the oxidation process of LDL cholesterol.	In this study, in obese working age women in Kendari City, there was no significant difference in HDL levels before and after EVOO administration, but HDL intervention before and after EVOO administration increased.
6.	Memon et al.,	2018	This research was conducted using the Randomized Controlled Trial (RCT) method at the Department of Biochemistry, Sindh Jamshoro University.	This study showed that there was a statistical normalization of serum cholesterol and serum TAG levels in the case study group compared to the control group.	Natural remedies (phytotherapy) have an important role in treating dyslipidemia in type II diabetics, and can also help prevent complications of dyslipidemia in the diabetic population.
7.	Khaw et al.,	2018	The method used was a 2-month randomized clinical trial.	Among the three intervention groups, there were no significant changes in body weight, BMI, central obesity, fasting blood glucose, systolic or diastolic blood pressure.	Differences caused by the effects of different dietary fats on lipid profiles, metabolic markers, and health outcomes are not only according to the general classification of the major constituent fatty

					acids as saturated or unsaturated, but may also correspond to different individual fatty acid profiles.
8.	de Sousa et al.,	2021	The research method is a clinical study involving three groups of rats fed a normal fat diet containing extra virgin olive oil (NO) extract or a high fat extra virgin olive oil (HO) diet for 12 weeks.	The data suggest that dietary H2O intake successfully induces hepatic adaptation, partially counteracting the detrimental effects of a high-fat diet, but without major changes in the liver proteome.	Following the HO diet reduces dietary intake and serum triglycerides while maintaining weight gain, obesity and blood glucose levels. However, it did increase serum cholesterol and liver mass.
9.	Anwari and Sutysna	2020	The research used is an experimental type with a pretest post-test design with a control group with simple randomization.	In the control group, the olive oil treatment group L, the moderate-intensity exercise treatment group, and the moderate-intensity exercise and olive oil treatment group there was an increase in HDL levels in the blood.	Olive oil (EVOO), moderate-intensity exercise, and olive oil with moderate-intensity exercise (EVOO) influenced the increase in blood HDL in male Wistar rats fed a high-fat diet.
10.	Otrante et al.,	2021	This study used a randomized trial method on 84 healthy respondents who were grouped by age, namely the young age group and the elderly group.	In all 84 studies, no significant changes in HDL levels were observed between baseline and 12 weeks after consuming olive oil extract. However, the efflux capacity of HDL cholesterol was significantly increased by 7.12%.	Found that HDL in the healthy elderly group was significantly reduced. Given the importance of cholesterol efflux as the first step in the RCT process, lowering HDL may have a significant impact on cellular cholesterol homeostasis and the development of the atherosclerotic process in the elderly.

4 DISCUSSIONS

The results of the data that have been collected; it was found that some subjects had a much higher fat consumption pattern than others. In several studies, there were subjects who experienced an increase in HDL levels caused by olive oil extract, namely the content of MUFA and PUFA. On the other hand, it can increase HDL cholesterol levels, thereby lowering LDL and total cholesterol levels in the blood.

Monounsaturated fatty acids (MUFA) in EVOO, namely oleic acid. The cis configuration of oleic acid has a protective effect against cardiovascular disease by preventing the absorption of cholesterol in the intestine so that the body's cholesterol levels

can decrease, and with the cis configuration structure it is not easily oxidized, because the fat oxidation process can cause atherosclerotic plaque formation (Ninaprilia et al., 2013)

There was an increase in HDL levels in the control group, L olive oil treatment group, and moderate intensity exercise treatment group. That olive oil (EVOO), moderate-intensity exercise, and olive oil (EVOO) with moderate-intensity exercise had an effect on increasing HDL levels in the blood given a high-fat diet. However, in several studies, no significant changes in HDL levels were observed between baseline and 12 weeks after consuming olive oil extract. Given the importance of cholesterol efflux as the first step in the RCT process, lowering HDL may have a significant

impact on cellular cholesterol homeostasis and the development of the atherosclerotic process in the elderly.

Then, no significant changes could be observed in the act of fasting. However, the olive oil group had an increase although there was no difference in substrate oxidation and a lack of metabolic flexibility was found. In addition, this study shows that consumption of olive oil in an enriched diet increases energy expenditure after consuming high saturated fatty acids which can improve weight maintenance over time.

The results of a study show that natural medicine has an important role in the treatment of dyslipidemia in type II diabetic patients, so that Phyto therapy can also take part in the prevention of complications due to dyslipidemia in the diabetic population. Natural medicines are commonly known as toga plants which have many benefits. In addition to olive oil, there is also celery which is believed to lower cholesterol levels in the blood because it contains high antioxidants. In addition to celery, there is also ginger as a drug that is believed to reduce hypertension (Melviani et al., 2022).

Daily consumption of olive oil is very beneficial for health, because olive oil contains many minerals such as sodium, calcium, magnesium, aluminum, iron, phosphorus and potassium, as well as the enzyme diastase, which can convert polysaccharides into monosaccharides, which promotes oxidation. While olive oil itself contains essential fatty acids, namely 55-85%, unsaturated fatty acids are important in the immune response and maintain internal stability, regulate metabolism, and also contain vitamins A, C and E, which are able to fight free radicals (Tomayahu et al., 2022).

Measurements on the effect of dietary intake of olive oil monounsaturated fatty acids on serum lipoproteins, bile cholesterol saturation index and gallbladder motility compared with a standard low-fat diet were evaluated in 11 young volunteers admitted to the metabolic ward. A significant reduction in mean total cholesterol was observed after an olive oil-fortified diet compared to a low-fat diet, the enriched diet had no effect on HDL and HDL subfraction cholesterol levels, biliary cholesterol saturation, fasting and postprandial gallbladder volume. Olive oil can be a natural fat that can be used to regulate plasma and LDL cholesterol as a suitable alternative to polyunsaturated fatty acids (G. Baggio et al., 1988).

The ratio of monounsaturated or saturated fat is high enough that the use of olive oil as a main ingredient in cooking and/or other traditional foods that are high in monounsaturated fat, such as nuts, and many plant foods, including fruits, vegetables and nuts. Interventions may include nutritional counselling, provision of adequate food or both. The control group received no intervention, minimal intervention, usual care, or other nutritional intervention (Khaw et al., 2018).

Butter and olive oil are two different dietary fats. Butter has a different effect on blood lipids compared to olive oil, which is the more common monounsaturated fat in coconut oil than olive oil for LDL cholesterol. The effects of different dietary fats on lipid profiles, metabolic markers and health outcomes may vary not only according to the general classification of their main component fatty acids as saturated or unsaturated, but also according to different individual fatty acid profiles, processing methods, and diets. where they are consumed, consumed or dieted. These findings do not change current dietary recommendations for reducing consumption of saturated fat in general (Khaw et al., 2018).

The discussion describes the results of the study which are compared with the theories contained in the literature review to find out the similarities and differences, and the researchers' arguments. If there are similarities, the research results reinforce the previous theory. If different, it means a new finding. Discussion is NOT just explaining / describing the results of research or presenting numbers in tables or graphs only.

5 CONCLUSIONS

Dyslipidemia is a lipid metabolism disorder characterized by an increase or decrease in the lipid fraction in plasma. The main lipid fraction abnormalities were increased total cholesterol, LDL cholesterol, increased triglyceride levels, and decreased HDL levels. The focus of this paper is the discussion of excess cholesterol. Excess cholesterol occurs because people's lifestyles are not very good and far from healthy lifestyle standards. Not infrequently, this lifestyle can cause a person to get Coronary Heart Disease (CHD) which according to WHO (World Health Organization) is one of the biggest causes of death in the world.

There are many methods of treating dyslipidemia, one example is the treatment of dyslipidemia using chemical drugs, herbal medicines and with dietary modifications. This herbal treatment also aims to reduce the side effects of using drugs for people with dyslipidemia in the long term. Therefore, there are many studies on herbal ingredients for the treatment of dyslipidemia, one example is olive oil. Olive oil is believed to lower cholesterol levels because it has a very high antioxidant content and is rich in substances that can lower cholesterol levels in the blood.

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