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The Effect of Extra Virgin Olive Oil on Low-Density Lipoprotein Levels in Productive Age Obesity Women in Kendari

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ABSTRACT

Obesity is one of the burdens of nutritional problems in women of childbearing age due to fat accumulation (adiposity) in the body, thereby increasing the risk of health problems. Obese subjects tend to have high LDL levels, so consuming olive oil every day for one week will experience a decrease in LDL cholesterol and increase antioxidant compounds. Olive oil used in the medical world is a type of extra virgin olive oil (EVOO) that contains monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), omega 3, omega 6, oleic acid (omega 9), vitamin E, vitamin K, palmitic acid, pigments, phenolic, squalene. This study was a quasi-experimental study with a pretest-posttest approach without a control group. The independent variable was 30 ml extra virgin olive oil (EVOO) for 21 days in obese women of productive age in Kendari. The results of this study obtained a p-value of 0.112. Extra virgin olive oil has no effect on LDL levels in obese women of productive age in Kendari.

Keywords : Extra Virgin Olive Oil, Low-Density Lipoprotein, Obesity Woman.

I. INTRODUCTION

Obesity is a multifactorial disease that occurs due to the accumulation of excessive fat tissue that can interfere with health. A person with an IMT of 30 or more is generally considered obese. A person with an IMT of 25 or more is deemed to be overweight. In 2016, more than 1.9 billion adults aged >18 years were overweight (39% of men and 40% of women). More than 650 million adults are obese (Setiati, 2014; WHO, 2020).

Obesity is one of the burdens of nutritional problems in women of childbearing age due to fat accumulation (adiposity) in the body, thereby increasing the risk of health problems. Based on the 2013 Basic Health Research, obesity in women of childbearing age in Indonesia reached 32.9%. Women of childbearing age with obesity will impact the female reproductive cycle, which causes infertility in women due to anovulation, irregular menstrual cycles, polycystic ovary syndrome (PCOS), increased risk of miscarriage, and even fetal death. (Nurramadhani, 2019; Hutasoit, 2020).

Indonesia has a relatively high prevalence of obesity at all age levels, ranging from 0-23 months to > 18 years. Based on Riskesdas data in 2018, adults (>18 years) had the highest prevalence of obesity, 21.8%. From 2007 to 2018, there was a more than doubled increase, from 10.5% in 2007 to 21.8% in 2018. Obese are at a higher risk of severe high blood pressure, heart failure, stroke, diabetes, gallbladder disease, and cancer. The danger in people who are obese is several times higher than in people of a healthy, average weight (Health Office of Kendari, 2017; Riskesdas, 2018).

The number of obesity in Southeast Sulawesi in 2017 was obtained through measurements of visitors to public health centers aged 15 years and over. The results showed that of the 975,299 residents who were examined, 46,763 or 25.93% were detected as obese. In contrast to the case of hypertension, obesity is more commonly found in women with a total of 28.10%, while in men, it is only 17.48%. These results are pretty worrying because they are in line with increasing obesity rates both in Indonesia and the world. Whereas Southeast Sulawesi, in terms of lifestyle and consumption patterns, is not like other more developed cities or regions in Indonesia (Health Office of Southeast Sulawesi, 2018).

In Kendari City, the number of obesity cases in adults (≥ 15 years) from 2015 to 2017 increased more than four times, from 698 people in 2015 to 2,919 in 2017, with sufferers dominated by women. The ratio of women and men respectively is 8.5: 1.5. The area of residence is also a risk factor for obesity. Subjects who live in urban areas are 1358 times more likely to be obese. The urban environment, such as access to food and transportation facilities, is thought to support a lifestyle that leads to obesity, such as easy access to fast food and transportation facilities that can reduce physical activity levels. (Health Office of Kendari, 2017; Diana et al., 2013).

Epidemiological studies have shown that a diet rich in antioxidants is associated with a reduced risk of lifestyle-related diseases. Consuming olive oil every day for one week will decrease LDL cholesterol oxidation and increase antioxidant compounds, mainly phenols, in the blood. Olive oil used in the medical world is a type of extra virgin olive oil (EVOO) that contains monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), omega 3, omega 6, oleic acid (omega 9), vitamin E, vitamin K, palmitic acid, pigment, phenolic, squalene (Utami et al., 2016; Setiyono & Gunardi, 2018).

EVOO is rich in MUFA and PUFA, which can increase LDL receptor activity and decrease LDL production. These changes also cause the plasma LDL concentration to decrease. The lipoprotein complex that binds to the LDL receptor will be carried to the cell membrane to form intracellular vesicles, enter the cytoplasm, and then separate the lipoprotein and LDL receptor. Research conducted by Al-Rewashdeh (2010) looked at the lipid profile of men and women who consumed EVOO for four weeks, showing a significant decrease in the mean LDL concentration from 103 mg/dl to 91 mg/dl. (Al-Rewashdeh 2010; Hasbi 2020).

Based on the description of the background above, researchers were interested in researching "The Effect of EVOO on LDL Levels in Productive Age Obesity Women in Kendari.

The formulation of the problem in this study was whether there was an effect of giving EVOO on LDL levels in productive age obesity women in Kendari. This study aimed to determine the effect of giving EVOO on LDL levels in productive age obesity women in Kendari City.

II. METHODS AND MATERIAL

The design of this study was quasi-experimental with a pretest-posttest approach without a control group. The independent variable was administering extra virgin olive oil (EVOO) to 15 obese women of

productive age in Kendari. Each subject was given 30 ml of EVOO for 21 days, and then two measurements of low-density lipoprotein (LDL) levels were taken, namely before and after EVOO administration.

The sampling technique in this study was purposive sampling using a comparative numerical formula in pairs with repeated two measurements. The samples obtained were 15 people consisting of several villages in Kendari City, namely Anduonohu, Lepo-Lepo, Baruga, Kambu, Kemaraya, and Lahundape villages. The LDL level examination was carried out at the Maxima Clinical Laboratory, Kendari.

This study's data type is primary data obtained from direct examination of LDL levels pre-test and post-test at Maxima Laboratory, Kendari. Then the data processing was carried out electronically by using the computer program software of IBM SPSS Statistics for Windows. This research has also received ethical clearance from the Health Research Ethics Commission, Faculty of Medicine, Halu Oleo University.

III. RESULTS

Table 1. Distribution of Respondents by Age

Age (Years)	N	%
15-19	7	46,7
20-24	8	53,3
Amount	15	100

Source: Primary Data, 2020.

Based on table 1, the distribution of respondents based on age found that seven people aged 15-19 years (46.7%), aged 20-24 years as many as eight people (53.3%).

Table 2. Distribution of Respondents Based on IMT

IMT (Kg/m²)	N	%
Obese I	12	80
Obese II	3	20
Amount	15	100

Source: Primary Data, 2020

In table 2, the distribution of respondents based on IMT was found to be obese I as many as 12 people (80%) and obese II as many as three people (20%).

Table 3. Distribution of Respondents Based on Total Saturated Fatty Acid Consumption

Total Saturated Fatty Acid Consumption	*Food Recall I*		*Food Recall II*	
	n	%	n	%
Low	0	0%	0	0%
Normal	7	46%	10	67%
High	8	54%	5	33%

Total Saturated Fatty Acid Consumption	*Food Recal III*	
	n	%
Low	0	0%
Normal	9	60%
High	6	40%

Source: Primary Data, 2020, 2021.

Based on table 3, the number of respondents who consumed high saturated fatty acids in food recall I was eight people (54%), food recall II was five people (33%), and food recall III was six people (40%). The number of respondents who consumed normal saturated fatty acids in food recall I was seven people (46%), food recall II was ten people (67%), and food recall III was nine people (60%). At the same time,

there were no respondents who consumed low saturated fatty acids (0%).

Table 4. Distribution of Respondents Based on LDL levels pre-test and post-test

Subject Number	LDL Levels of *Pre-Test* (mg/dl)	Average of LDL Level (mg/dl) *pre-test* ± SD	LDL Levels of *Post-Test* (mg/dl)	Average of LDL Levels (mg/dl) *post-test* ± SD
S1	148		140	
S2	154		167	
S3	123		97	
S4	135		123	
S5	119		98	
S6	154		129	
S7	126		115	
S8	115	132 ± 16,21	107	123,9 ± 26,4
S9	134		98	
S10	126		105	
S11	127		143	
S12	161		169	
S13	138		159	
S14	112		120	
S15	109		89	

Source: Primary Data, 2020, 2021

Based on table 4, it was found that the mean LDL level in the respondents before the intervention (pre-test) EVOO was 132 ± 16.21, and the mean LDL level in the subjects decreased after the intervention (post-test) was 123.9 ± 26.4.

Table 5. Effect of Extra Virgin Olive Oil (EVOO) on Low-Density Lipoprotein (LDL) Levels

Test Result	**Average LDL level (mg/dl) ± SD**	**N**	***P-Value***
Pre-test	132 ± 16,21	15	0,112
Post-test	124,5 ± 25,6	15	

Table 5, using paired t-test, shows a p-value of 0.112, which illustrates that the results are not significant. So that there is no effect of giving extra virgin olive oil on LDL levels in productive age obesity women in Kendari.

IV. DISCUSSION

Based on the study results, the average LDL level in 15 subjects of productive age obesity women decreased from 132 ± 16.21 to 123.9 ± 26.4, but statistically not v. Statistically, the standard v of the pre-test and post-test was quite large, sot that the obtained LDL levels were very diverse. The insignificant decrease in LDL levels can be influenced by the consumption pattern of saturated fat, which the researchers cannot control. Based on table 7, it was found that the consumption pattern of saturated fat was relatively high in some subjects. Sastroamidjojo (2000) states that consuming foods high in fat and cholesterol will increase total cholesterol levels and LDL levels. The liver will have enough cholesterol levels and stop taking LDL, increasing total cholesterol levels (Yoeantafara, 2017).

Subjects who experienced a decrease in LDL levels in this study based on the distribution of IMT consisted of 7 obese subjects I and three obese subjects II. The age distribution consists of 5 subjects aged 15-19 years and five subjects aged 20-24 years who tend to have

normal fat intake based on food recall data. It is because EVOO contains MUFA and PUFA, which can increase the activity of LDL receptors and reduce the level of LDL production. These changes also cause the plasma LDL concentration to decrease. The lipoprotein complex that binds to the LDL receptor will be carried to the cell membrane to form intracellular vesicles, enter the cytoplasm, and then separate the lipoprotein and LDL receptor. Lipoproteins are degraded in lysosomes, and LDL receptors return to the cell surface (Hasbi et al., 2020; Lim, 2013).

EVOO can also reduce the production of cholesterol levels through the adenosine-monophosphate protein kinase (AMPK) pathway, which inhibits the regulation of the HMG-CoA reductase enzyme in cholesterol synthesis acetyl-CoA carboxylase (ACC), thereby reducing cholesterol esterification in the intestine and liver. If cholesterol formation is inhibited, VLDL will not be hydrolyzed and will suppress LDL in the blood (Lammi et al., 2020).

EVOO has the main content in flavonoid compounds, oleuropein, and phenolic compounds such as hydroxytyrosol and tyrosol. Based on research, flavonoid compounds, oleuropein, hydroxytyrosol, and tyrosol have good benefits for the body. Flavonoids as antidyslipidemia can reduce LDL by inhibiting the secretion of alpha lipoprotein-B100 into the intestine to decrease the amount of Apo-B. Apo-B is the formation of VLDL and LDL; when Apo-B decreases, VLDL and LDL will also decrease (Herina, 2017; Ibrizah, 2017).

In line with research conducted by Roberto et al. (2001), they looked at the effect of giving olive oil on LDL levels in hyperlipidemic patients with ten research subjects. Administration of olive oil at a dose of 20 ml/day for four weeks showed insignificant results with p-value > 0.05, but the mean LDL level of the research subjects decreased from 172.4 ± 23.0 to 165.9 ± 23.1 (Masella, 2001).

In this study, some subjects experienced an increase in LDL levels after giving EVOO. Based on the distribution of IMT, which consists of 5 obese subjects I. The age distribution consisted of 2 subjects aged 15-19 years and three subjects aged 20-24 years and tended to consume quite high fat based on food recall data. It is because the consumption patterns and physical activity of the research subjects were not controlled. Murtianingsih (2007) in Semarang showed a relationship between energy intake, total fat, saturated fatty acids, and physical activity with LDL cholesterol levels. High-fat food intake is associated with fatty acid and cholesterol components on blood cholesterol, especially LDL cholesterol. Increased consumption of saturated fat and cholesterol can increase LDL concentrations (Agustiyanti, 2017).

V. CONCLUSION

Based on the results and discussion, it can be concluded that there is no effect of giving extra virgin olive oil on LDL levels in productive age obesity women in Kendari.

VI. LIMITATION AND STUDY FORWARDS

The results of this study are not entirely perfect due to the limitations of the researcher. The suggestions for further researchers are expected to measure the LDL levels of research subjects every week, not only before and after EVOO administration, so that the data obtained is complete and accurate, which can control the food consumed by research subjects so that it does not cause an increase in LDL levels in subjects who have a high-fat consumption pattern and can manage the time of giving Extra Virgin Olive Oil consistently.

It is hoped that medical officers can take advantage of the results of this study as information about the benefits of extra virgin olive oil on low-density lipoprotein levels.

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