

Efek Campuran Lemon Dan Minyak Zaitun (Lezat) Terhadap Kadar Kolesterol Pasien Hipertensi

Effects Mixtures of Lemon and Virgin Olive Oil on The Cholesterol Levels of Hypertensive Patients

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Abstrak

Penelitian ini mengevaluasi pengaruh pendek campuran lemon dan minyak zaitun terhadap kadar kolesterol pasien hipertensi. Penelitian quasi eksperimental dengan pretest-posttest without *control group design* dilakukan pada 18 pasien hipertensi dengan purposive sampling. Sampel menerima campuran 30 ml lemon dan 30 ml minyak zaitun, sekali sehari 30 menit sebelum sarapan selama 14 hari. Kadar kolesterol diukur sehari sebelum (hari 0) dan hari ke-14 pemberian. Kadar kolesterol rata-rata pretest adalah $265,83 \pm 53,52$ mg / dl, dan posttest adalah $228,67 \pm 55,14$ mg / dl. Hasil uji-T sampel berpasangan terdapat perbedaan yang bermakna pada kadar kolesterol pasien ($p = 0,023$; $p < 0,05$).

Kata kunci : hipertensi; lemon; minyak zaitun; kolesterol; keperawatan

Abstract

The study evaluated the effect of mixtures of lemon and virgin olive oil on the cholesterol level in hypertension patients. A quasi-experimental study, with a pretest-posttest without control group design, did on 18 purposively sampling hypertension patients. Samples received mixtures of 30 ml lemon squeeze and 30 ml virgin olive oil once a day 30 minutes before breakfast for 14 days. The cholesterol level was measured the day before (day 0) and the 14th days of administration. The pretest's mean cholesterol level was 265.83 ± 53.52 mg/dl, and the posttest was 228.67 ± 55.14 mg/dl. Paired sample T-test showed significant differences before and after administration of mixture ($p = 0.023$; $p < 0.05$).

Keywords: Hypertension, Lemon, Virgin Olive Oil, Cholesterol, Nursing

INTRODUCTION

Cardiovascular disease is the leading cause of death in various developing and developed countries (Oboh, Bello, Ademosun, Akinyemi, & Adewuni, 2015). The study shows that the disease caused by multi-factors, such as genetic and environmental factors, plays a role in cardiovascular disease (Choudhury, Mainuddin, Wahiduzzaman, & Islam, 2014; Gupta, Rai, Toppo, Kasar, & Nema, 2018). Some cardiovascular disease factors that can neither be changed nor controlled include age, gender, race/ethnicity, and family history. At the same time, risk factors that can be altered or controlled include smoking, alcohol, obesity, dyslipidemia, diabetes mellitus, and hypertension (Budiman, Sihombing, & Pradina,

2015). Hypertension can increase the workload of the heart. Continuously high blood pressure causes the arteries' damage because of the slowly hardened arteries experience (atherosclerosis) and the coronary occlusion (Budiman et al., 2015). Endothelial dysfunction is a phenomenon regarding the development of atherosclerosis and cardiovascular disease in hypertensive patients (Moreno-Luna et al., 2012). The endothelial dysfunction is characterized by a marked decrease in bioavailability of nitric oxide (NO) and increased levels of oxidized low-density lipoprotein (LDL). One of the predominant mechanisms in the NO inactivation is a change L-arginine-NO pathway by oxidative stress. It is resulting in increased plasma level asymmetric dimethylarginine (ADMA). Rising of ADMA will lead to the deterioration in the oxidation stress that occurs. The activity reduction of dimethylarginine dimethylaminohydrolase (DDAH) by reactive oxygen species increases intracellular ADMA accumulation that contributes to ADMA exports. Both pro-oxidant status and increased ADMA are regarded as conditions linked to atherosclerosis and hypertension (Moreno-Luna et al., 2012).

Dyslipidemia defined as a disorder of lipid metabolism characterized by an increase or decrease in the lipid fraction of the plasma. The significant lipid abnormalities fraction are the increase in the total number of cholesterol (C-total), LDL cholesterol (C-LDL), triglycerides (TG), and the decrease in the HDL cholesterol (C-HDL) (Arsana et al., 2015). Dyslipidemia is a risk factor for atherosclerosis. The disruption of the lipid profile in the blood is an accumulation of fat in the lining of blood vessels, which ultimately reduces the blood vessel lumen diameter as a result of ischemia with subsequent manifestations of infarction (Budiman et al., 2015). Therefore, hypertension must be properly managed so that it does not have a worse impact on the sufferer. Hypertension management can be generated using drugs or lifestyle modification (Kemenkes.RI, 2014). Although pharmacological treatment has a significant result in decreasing blood pressure and dyslipidemia, lifestyle modification, and diet improvement are crucial in cardiovascular disease management (Aslani, Entezari, Askari, Maghsoudi, & Maracy, 2016). Vegetables and fruits contain different phytochemicals in line with anti-inflammatory and vascular reactivity (Aslani et al., 2016; Moreno-Luna et al., 2012). Some foods that are believed to be useful for reducing inflammation and improving endothelial function include olive oil and lemon.

As a family of citrus fruits, lemon (*Citrus limon*) has long been known as healthy food. It is because lemon is a fruit rich in eriocitrin and hesperidin flavones. Lemon can be consumed directly by squeezing or making juice (Oboh et al., 2015). Olive oil (*Olea europea*) is the primary fat source and believed to be the healthiest source of fat in the Mediterranean diet (Covas, De La Torre, & Fitó, 2015). In Olive Oil, minor components found are phenolic compounds, which are potent antioxidants that provide significant benefits in health (Moreno-Luna et al., 2012). Virgin Olive Oil (VOO) type of olive oil is rich in phenolic compounds, and the European Food Safety Authority has also released benefits from daily consumption of VOO, which is rich in phenolic compounds in November 2011 (Covas et al., 2015). Some researches on the effects of olive and lemon oils on reducing inflammatory biomarkers and lipid profiles include total cholesterol in patients with cardiovascular disease have been undertaken separately. In comparison, topics on mixtures of lemon juice (*Citrus limon*) and virgin olive oil (*Olea europea*) in this research are under-researched. For addition, the results of a preliminary study found that many hypertension patients in Gilangharjo village had a history of hypercholesterolemia, and they admitted that they would be happy if there were a natural therapy to lower cholesterol. Therefore, this study aimed to see virgin olive oil and lemon juice combined in lowering cholesterol in hypertensive patients.

METHOD

Study design

This research has passed ethical clearance from Jenderal Achmad Yani Yogyakarta University's ethics committee. This pre-experiment research was conducted on 18 hypertension patients using purposive sampling in Gilangharjo Village, Pandak, Bantul, Yogyakarta in August 2018. This research used one group pretest and posttest without control design.

Sample

Samples selected with inclusion criteria as hypertension patients with minimum age 30 years old who routinely seek treatment, have a cellular telephone with video features, have social or communication media to send videos, and do not take drugs to cholesterol/fat-lowering during the study. Samples who have a sensitive gastrointestinal tract and refused to drink the mixture before breakfast were excluded.

Lemon and virgin olive oil mixture preparation

The guidelines for making the mixture was adopted and modified from the research conducted by Hasan et al. and Khan et al. (Hasan, Singh, Siddiqui, Kulshreshtha, & Aggarwal, 2013; Khan, Khan, Afroz, & Siddiq, 2010). The way to make the mixture is using a lemon (*Citrus limon*) and virgin olive oil (*Olea europea*). After the two ingredients obtained, the lemon then squeezed using a squeezing device. The lemon juice results are taken as much as 30 ml, and mixed with 30 ml of virgin olive oil. After being mixed, lemon and virgin olive oil are then stirred and taken immediately 30-60 minutes after breakfast.

Data Collection

Data obtained through the scheme:

1. Day 0: In the afternoon, eligible samples got explaining the purpose and course of the study.
2. Samples who are willing to participate in the study signed informed consent and taught how to make the mixture correctly.
3. Samples were collected and checked for cholesterol levels before treatment (pretest).
4. Before returning home, the sample provided with the mixture making guidelines, 500 ml virgin olive oil, orange squeezer, measuring cup, and five medium-sized lemons.
5. Days 1 - 14: Respondents drank the mixture made according to the guidelines every morning 30 -60 minutes before breakfast for 14 consecutive days. When drinking the mixture, the respondent is obliged to record the activity then send the video recordings to the research or research assistant every day.
6. Lemon preparations were given for five days of stocks. Every five days, researcher assistants come to the respondent's house to check the intervention needs (checklist and other ingredients) and possible obstacles (drop out, failure).
7. Day 14: In the afternoon, samples who have carried out a complete intervention for drinking the mixture for 14 days without being missed are visited one by one and rechecked the cholesterol (posttest).

Data Analysis

Data were analysed using the Paired Sample T-Test because it met the data normality test requirements.

Ethical Clearance

This research has passed the ethical clearance from Jenderal Achmad Yani University with number Skep / 374 / KEPK / VI / 2018.

RESULTS AND DISCUSSION

Results

The demographic data of the study presented in table 1. Finding the demographic data shows that the majority of respondents were women (83%) with BMI categories above average (44.4% Overweight and 11.2% Obesity), all of them have Type II Diabetes mellitus (100%), and the average age of 57.1 ± 9.75 years.

Table 1. Demographic Characteristics of Hypertension Patients in Gilangharjo (n=18)

Characteristic		Σ	%
Gender	Man	3	17
	Woman	15	83
BMI	Normal	8	44,4
	Overweight	8	44,4
	Obese	2	11,2
DM	Yes	18	100
	No	0	0
Mean		Min-Max	DS
57.1		44-81	9.75

Table 2. Pretest and Posttest of Cholesterol Levels in Lemon and Virgin Olive Oil Mixture Administration (n=18)

Cholesterol	Mean	N	Min-Max	SD
Pretest	265,83	18	200-400	53,52
Posttest	228,67	18	160-340	55,14

Table 2 shows that the average cholesterol level ahead of the mixture administration (pretest) was 265.83 ± 53.52 mg/dl and the average cholesterol level after the mixture (posttest) administration was 228.67 ± 55.14 mg/dl, meaning that there was a change in the form of reducing cholesterol levels by 37.17 mg/dl.

Table 3. A paired t-test of Lemon and Virgin Olive Oil Mixture Administration (n=18)

Variable	Mean	SD	t	df	pv
Cholesterol level	37.167	62.985	2.504	17	.023

Table 3 shows the results of the Paired Sample T cholesterol test along with the final result $pv = 0.023 (<0.05)$, which means that there are significant differences in cholesterol levels of hypertensive patients in Gilangharjo Village, Pandak, Bantul, Yogyakarta after the administration of a mixture of lemon and virgin olive oil.

Discussion

This research aims to determine the effects of a mixture of lemon juice and virgin olive oil on the reduction of cholesterol levels in hypertensive patients in Gilangharjo village, Pandak, Bantul, Yogyakarta. The results of the paired sample t-test statistical test proved that there were significant differences ($p=0.023$) of cholesterol levels in hypertensive patients in Gilangharjo Village, Pandak, Bantul, Yogyakarta before and after the treatment of a mixture

of lemon and virgin olive oil. The results of this study support the results of previous studies conducted by Violante et al. (2009) and Khan et al. (2010), which stated that the provision of virgin olive oil and lemon juice could reduce cholesterol levels in hyper cholesterol patients (Violante, Gerbaudo, Borretta, & Tassone, 2009; Yasmin, Khan, Syeda, & Afshan, 2010). However, the results of this study are somewhat different from the results of research conducted by Yuiwanti et al. (2018), which stated that compared to virgin olive oil, virgin coconut oil has more potential to maintain cholesterol in hyperglycemic *Rattus rattus norvegicus* (Wachidah Yuiwanti, Saraswati, & Kusdiyantini, 2018).

Several epidemiological studies have reported the use of olive oil on health accordingly. Virgin Olive Oil (VOO) contains many phytochemicals (natural plant chemicals), vitamins, antioxidants, and polyphenols that have been clinically proven to be useful for health through various methods (Hasan et al., 2013). A study by Covas et al. (Covas et al., 2015) outlined that the consumption of virgin olive oil can reduce the risk of heart disease. One way to avoid or minimize the risk of heart disease is to consume unsaturated fatty acids, and virgin olive oil is the best source of unsaturated fatty acids.

Another study by Hasan et al (Hasan et al., 2013) highlighted a case about the importance of giving 30 ml of virgin olive oil every day for six weeks in 30 men who had hyperlipidemia. The results showed a significant decrease in LDL, triglycerides, and total cholesterol, as well as an increase in HDL levels. The oxidized LDL plays an essential role in the case of atherosclerosis. MUFA and some phytochemical contents in pure olive oil produce LDL, which is more resistant to the oxidation process. This results in a reduced effect of oxidation, thrombogenicity, and plaque formation that emerges to protect the body from atherosclerosis (Hasan et al., 2013). Three flavonoids (flavanones, flavones, and flavonols) and more than 60 other flavonoids have been identified from citrus/citrus fruits. Lemon (*Citrus limon*) is a family of citrus fruits that has long been known as healthy food. This is because lemon is a fruit that is rich in eriocitrin and hesperidin flavones (Obloh et al., 2015).

Citrus limon (lemon) contains a crucial natural component, including citric acid, ascorbic acid, minerals, and flavonoid (Khan et al., 2010). Flavonoids in lemons have several different biological functions, including antioxidants, anti-inflammatory, anti-allergic, antiviral, anti-proliferative, anti-mutagenic, and anti-cyanogenic drugs (Khan et al., 2010). Lemon can be consumed directly by squeezing or making juice (Obloh et al., 2015). Research conducted on rats and rabbits showed that eriocitrin and hesperidin have antioxidant properties, and they can reduce the oxidation stress (Aslani et al., 2016; Boshtam, Naderi, Moshtaghian, Asgary, & Jafari, 2009). The research conducted by Obloh et al (Obloh et al., 2015) examined that administration of lemon juice in rats given high cholesterol food gave significant results in reducing the total number of cholesterol, triglyceride, and LDL and increasing HDL levels along with the mechanism of inhibiting angiotensin activity -1-converting enzyme (ACE).

Considering the administration of lemon juice in rats with a high cholesterol diet intake for four weeks. Khan et al. (Khan et al., 2010) showed that taking 1 ml/KgWB of juice or lemon juice/day significantly reduced serum cholesterol levels, triglycerides, LDL, and increasing levels of HDL. In short sentences, lemon reduces the risk of heart disease through the content of eriocitrin and hesperidin, which has antioxidant properties. It can reduce the oxidation stress and its ability to reduce the total number of cholesterol, triglycerides, LDL, and increase HDL levels by inhibiting angiotensin-1-converting enzyme activity (ACE). The same combination of two functions between virgin olive oil and lemon can reduce the total number of cholesterol, LDL, triglyceride levels, and increase HDL levels. Thus, the cholesterol levels decreased by 37.17 mg/dl after respondents underwent lemon and virgin

olive oil mixtures consumption during 14 days without interruption within 30-60 minutes before breakfast.

CONCLUSION

Our results showed that the average cholesterol level of the pretest was 265.83 ± 53.52 mg/dl, and the mean cholesterol level of posttest was 228.67 ± 55.14 mg/dl, meaning that there was a change in cholesterol levels by 37.17 mg/dl. Paired Sample T-Test results obtained $p= 0.023 (<0.05)$, which means that there are significant differences in cholesterol levels of hypertensive patients in Gilangharjo Village, Pandak, Bantul, Yogyakarta after the treatment of a mixture of lemon and virgin olive oil.

RECCOMENDATION

Mixture of lemon and virgin olive oil might be useful for community nurses as an additional method to reduce cholesterol in hypertension patients.

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