STRADA : Jurnal Ilmiah Kesehatan
DOI: https://doi.org/10.30994/sjik.v14i1.1259
ISSN: 2252-3847 (print); 2614-350X (online) Vol.14 No.1 May 2025 Page. 132-140

The Effect of Giving a Combination of Tomato Juice and Virgin Coconut Oil on Total Cholesterol and LDL Levels

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ABSTRACT

Cholesterol and Low Density Lipoprotein (LDL) can be harmful to the body if they are present in large amounts in the blood, causing deposits on the walls of blood vessels and narrowing. The purpose of this study was to determine the effect of giving tomato juice and virgin coconut oil on changes in total cholesterol and LDL levels. This research design was a pre-experiment with the One Group Pretest-Posttest approach, conducted at the Blabak Village Posbindu. The population in this study were all hypercholesterolemia sufferers at the Blabak Village Posbindu as many as 60 people, with a random sampling technique and a sample of 20 respondents. The measuring instrument used was a lipid profile examination, tested with a Paired sample T-Test. The results of the study showed that the average change in total cholesterol levels was 26.10 mg/dl and most respondents experienced a significant decrease in LDL of around 20-30mg/dl. The results of statistical tests showed that there was a difference in initial and final total cholesterol and LDL levels with a p value = 0.017 (α <0.05) while the results of LDL analysis showed an α value of 0.000 (α <0.05). The content of medium chain fatty acids in coconut oil can increase the solubility of carotenoids in tomatoes. Lycopene, which is the main carotenoid in tomatoes, can prevent the activity of the enzyme 3-hydroxy-3-methylglutaryl-CoA reductase (HMGCoA reductase), which is a key enzyme in cholesterol synthesis, so that cholesterol synthesis is inhibited.

Keywords: low density lipoprotein (LDL), tomato juice, total cholesterol, virgin coconut oil

Received March 5, 2025; Revised April 10, 2025; Accepted May 10, 2025

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BACKGROUND

Cholesterol is an important part of cells that resembles wax and in the human body is responsible for carrying out many of the body's main functions (Hasdianah, 2016). Total cholesterol includes Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL) and triglycerides (Husein et al., 2020).

The prevalence of hypercholesterolemia in Indonesia has not been well recorded, but it is estimated that the prevalence will continue to increase. The World Health Organization (WHO) stated that the death rate caused by CHD reached 1.8 million cases in 2020, which means that CHD is a deadly disease in the Asian region, one of which is Indonesia. The death rate caused by CHD in Indonesia is quite high, reaching 1.25 million people if the population of Indonesia is 250 million (Ministry of Health, 2020). The results of the Basic Health Research (2019) showed that 1.5% or 15 out of 1,000 Indonesians suffer from coronary heart disease. Meanwhile, when viewed from the highest cause of death in Indonesia, according to the Sample Registration System Survey (2018), 12.9% of deaths were due to coronary heart disease. Data from the Indonesian Ministry of Health (2019) states that the prevalence of coronary heart disease in East Java in 2019 based on a doctor's diagnosis was 0.5% or around 144,279 sufferers, while the prevalence of coronary heart disease in East Java based on a doctor's diagnosis or symptoms was 1.3% or around 375,127 sufferers and is the highest number of coronary heart disease sufferers.

A preliminary study conducted on September 16, 2023 at the Blabak Village Posbindu found that 60 people had cholesterol levels of more than 200 mg/dL and the results of data collection in the Blabak Health Center UPTD area conducted in 2023 obtained data that 125 people had cholesterol levels> 200 mg/dL. The results of interviews with 10 people obtained data that they did not know that the combination of tomato juice and Virgin coconut oil could be used as an alternative medicine to lower cholesterol and LDL levels.

Normally, cholesterol is produced by the body. However, if you tend to consume foods high in fat, it causes cholesterol to be in excessive amounts in the blood. As a result of lifestyle and consuming unhealthy foods and lack of activity and often consuming foods high in fat. Abnormal cholesterol levels will increase the risk of atherosclerotic plaque formation in micro blood vessels. Atherosclerosis is the formation of plaque in the lumen of blood vessels caused by an increase in total cholesterol levels in the blood containing LDL, HDL, and triglycerides, so that there is an accumulation of LDL cholesterol in the blood vessels due to consuming foods containing high fat and cholesterol, triggering an increase in the number of ROS (Reactive Oxygen Species) in the body. As a result, endothelial dysfunction and inflammation occur. Thus, LDL cholesterol that is not compensated by HDL to be carried back to the liver causes LDL to accumulate in the walls of blood vessels, resulting in the formation of foam cells which will unite to form plaque (fatty streak) as an indicator of damage to the histological structure of the aorta (Vradinatika, 2020).

Cholesterol examination is one of the laboratory tests to determine the presence of dyslipidemia and is related to the occurrence of CHD. Cholesterol is normally produced by the body itself in the right amount. Total blood cholesterol levels should be <200 mg/dl, if ≥ 200 mg/dl means the risk of heart disease increases (Listiyana et al., 2013).

People often use drugs to lower cholesterol levels, one of which is simvastatin which is known to inhibit cholesterol biosynthesis (Gustaman, 2019). However, according to (Hardimarta, 2020) long-term use of simvastatin will cause pancreatic and liver dysfunction. Tomatoes have many health benefits because they contain quite high antioxidants and bioactive components such as vitamins C and E, as well as many carotenoids. As the main carotenoid in tomatoes, lycopene has a positive effect on health, if tomato consumption is increased. Tomato juice is one of the high-fiber foods. Tomatoes in juice form are easily

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absorbed and digested. Drinking a glass of tomato juice a day can significantly reduce Low Density Lipoprotein (LDL) levels in the blood. Lycopene is an antioxidant that can affect the lipid profile. Fresh tomatoes contain 8.8mg/100g of lycopene. Several studies have shown that tomatoes can improve blood lipid levels. The lycopene content in tomatoes can lower LDL levels by inhibiting the activity of HMG-CoA reductase so that cholesterol synthesis is inhibited, thus being useful in preventing coronary heart disease.

According of Pramesti, et al (2016) who has studied the effect of giving tomato juice on blood cholesterol levels in adults (45-55) in Dusun IV Ngrame Taman Tirto Kasihan Bantul Yogyakarta with the results of the study showing a difference in blood cholesterol levels in hypercholesterolemic adults before and after being given tomato juice in the intervention, thus clinically the blood cholesterol levels from pre-test to post-test showed a significant decrease. The results of the analysis using an unpaired t-test where the p value 0.005.

Coconut oil consumption can have a positive effect on lipid profiles. Coconut oil (Cocos nucifera L.) is a member of the tropical oil group that has been used for centuries in the traditional diets of tropical communities. Virgin coconut oil (VCO) is produced from coconut fruit extract through a process without heating or by heating at low temperatures. VCO contains more medium-chain saturated fatty acids (C atoms ≤12). Gampamole found that consuming VCO for two weeks at a dose of 2x30 ml per day can increase blood HDL-C levels. Supriatna's research (2018) The effect of VCO processing methods on blood glucose and cholesterol in male white mice can reduce total cholesterol levels at a dose of 0.81 mL/kg BW/day with an average decrease of 86 mg/dL to 75.6 mg/dL. Other studies have shown that administration of VCO and its hydrolysis at a dose of 0.3 mL/kg BB/day can reduce blood sugar levels and total cholesterol levels with an average decrease of 152.20 mg/dL to 86.20 mg/dL (Sinaga, 2019).

This study was conducted to help the community to find out the effect of tomato juice and virgin coconut oil to lower cholesterol and LDL levels, and to help reduce pharmacological treatment. In addition, from WHO and Riskesdas data, the number of deaths due to heart disease is one of the causes of hypercholesterolemia, so this study was conducted by combining tomato juice and Virgin Coconut Oil to lower cholesterol and LDL levels in the blood.

METHODS

This study uses a Pre-Experimental research design with a one group pre-post test approach, namely one group pretest-posttest design is a research activity that provides an initial test (pretest) before being given treatment, after being given treatment then giving a final test (posttest) (Sugiyono, 2023). The population in this study were all hypercholesterolemia sufferers at the Blabak Village Posbindu as many as 60 people, the Random Sampling method Random Sampling method and number of samples using the Federer formula basis, obtained a sample of 20 respondents. The Independent Variable in this study is a combination of Tomato Juice and Virgin coconut oil, while the dependent variable in this study is total cholesterol and LDL levels. Given an intervention combination of Tomato Juice and Virgin coconut oil 230 ml 2 x 1 (for 14 days), cholesterol and LDL levels were measured by examination of the Kediri City LABKESDA Laboratory and observation sheets. Analysis test using Paired Test, research ethics were conducted at the Strada Indonesia University campus with Numbers: 001294/EC/KEPK/I/05/2024 and 001293/EC/KEPK/I/05/2024.

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RESULTS

A. Respondent characteristics

Based on research data, it was found that the majority were female, as many as 14 people (70%), the majority of respondents were aged 41-50 years, as many as 12 people (60%), and the majority of respondents were unemployed, as many as 9 people (45%).

B. Variable characteristics

Table 1. Table of LDL levels before and after intervention

Kadar LDL	Before	After
Mean (Rata-rata)	146.95	118.35
Minimum	125	83
Maksimum	167	147
SD	13.24	17.33
P-value Normalitas	0,376	
p-value Paried Simple T-tes	0,000	

Table 1 shows the Results of LDL Levels in the Intervention Group Before and After Being Given a Combination of Tomato Juice and Virgin Coconut Oil at the Blabak Village Posbindu, an average decrease in LDL levels was found before and after the intervention of 20-30 mg/dl. With the highest average before the intervention being 167 mg/dl and after the intervention being 147 mg/dl.

The results of the paired sample T-test obtained a p value of 0.000, so there is a significant effect of giving tomato juice and VCO on LDL levels.

Table 2. Cholesterol levels before and after intervention

Kolesterol Total	n	Mean	SD	Min	Mak
Pre Test	20	220,15	10,723	203	241
Post Test	20	194,05	8,023	181	208

Table 2 shows that the average initial total cholesterol level of respondents was 220.15 mg/dl ± SD 10.273 with a minimum value range of 203 mg/dl and a maximum value of 241 mg/dl, while the average final total cholesterol level of respondents was 194.05 mg/dl ± SD 8.023 with a minimum value range of 181 mg/dl and a maximum value of 208 mg/dl. Results of LDL Levels in the Intervention Group Before and After Being Given a Combination of Tomato Juice and Virgin Coconut Oil at the Blabak Village Posbindu found changes in total cholesterol after being given a combination of tomato juice and virgin coconut oil to respondents, and the total cholesterol levels that decreased the highest were 41 mg/dl and the lowest were 10 mg/dl, with an average change of 26.10 mg/dl + 9.414 mg/dl.

The results of the Paired Sample T-Test analysis obtained p = 0.000. Because the p value is less than α (α = 0.05), this means that H_0 is rejected and H_1 is accepted, which means that there is a significant difference between blood cholesterol levels before and after being given a combination of tomato juice and Virgin coconut oil.

DISCUSSION

Total cholesterol and LDL levels before intervention

Total cholesterol levels before the intervention of a combination of tomato juice and

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virgin coconut oil in hypercholesterolemia patients at the Blabak Village Posbindu were known to be on average 220.15 mg/dl + 10,723 mg/dl or in the high category. The average LDL levels of respondents had a fairly high LDL level, namely >150 mg/dl. Respondents in this study had an age range of 23-50 years, respondents who experienced hypercholesterolemia were mostly in the age range of 45-65 years. This is in line with Aulia's research (2021) which showed that high total cholesterol levels (>200 mg/dl) were more common in respondents aged> 45 years compared to respondents aged <45 years. At the age of over 45 years, there is a decrease in the ability of LDL receptors so that LDL levels in the blood will increase and have an impact on the process of blood vessel blockage so that hypercholesterolemia occurs.

In this study, there were 10 female samples (50%) aged > 40 - 65 years (pre-menopause), according to Prissilia's research. D, et al (2019) in the e-Clinic journal Vol 4, entitled Lipid profile of menopausal women at Panti Werdha Damai Manado, concluded that pre-menopausal women aged 40 years and post-menopausal women aged 65 years experienced a decrease in estrogen hormone production. The estrogen hormone functions to provide cardioprotective action by maintaining the amount of HDL cholesterol and lowering LDL cholesterol and triglycerides.

The results of this analysis are in line with research conducted by Zuhroiyyah, et al (2019) which states that physical activity has a significant relationship with LDL cholesterol levels. According to Thompson and Rader (2020), to improve the lipid profile, good physical activity is needed. In the blood, the lipid profile is influenced by several enzyme activities, namely lipoprotein lipase enzymes, lecithin cholesterol acyltransferase, hepatic TG lipase. As a person's activity increases, the activity of the lipoprotein lipase enzyme in fat and muscle tissue will also increase. If the physical activity is lacking, the activity of the lipoprotein lipase enzyme will not increase so that it will not reduce LDL cholesterol levels. The capacity of skeletal muscles can increase in oxidizing fatty acids into carbon dioxide and water when doing physical activity. This mechanism is related to the release of fatty acids from tissues and can increase the activity of the lipoprotein lipase enzyme which leads to the transport and degradation of fatty acids. The decrease in LDL cholesterol occurs due to the presence of lipoprotein lipase which helps move LDL from the blood to the liver, which is then secreted or converted into bile. HDL cholesterol levels also increase, this is caused by lipoprotein lipase which reduces the catabolism of HDL apoprotein and HDL catabolism (Thompson and Rader, 2020). The purpose of doing regular physical activity is to achieve ideal body weight, reduce the risk of metabolic syndrome, and control CHD risk factors. The effect of physical activity on lipid parameters is mainly in the form of decreasing triglycerides and increasing HDL cholesterol (PERKI, 2022).

According to researchers, variations in cholesterol and LDL values before intervention was given to each individual in this study could be caused by one of the factors causing hypercholesterolemia. Factors causing hypercholesterolemia can also be interrelated in aggravating high cholesterol levels in the blood. For example, hypercholesterolemia sufferers who have cholesterol levels of 200-241 mg/dl have a habit of consuming more fat than calorie needs. Smoking and alcohol consumption habits will aggravate cholesterol levels in the blood, and can even trigger other disease disorders even though these factors are not included in the groups included in this study.

Total cholesterol and LDL levels after intervention

Total cholesterol levels after the intervention of a combination of tomato juice and virgin coconut oil in hypercholesterolemia patients at the Blabak Village Health Post were found to be on average 194.05 mg/dl + 8.023 mg/dl. Respondents' habits of consuming fatty foods can increase total cholesterol levels in the blood. WHO (2023) recommends that

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consuming energy from fat should not exceed 30%. High fat intake increases total cholesterol levels which can increase the risk of heart disease.

The clinical manifestation of hypercholesterolemia is a complaint of headaches, especially felt in the nape and back of the head around the back of the neck bone, feeling stiff to the shoulders, often feeling tired and exhausted, painful joints, sometimes swollen feet and drowsiness (Yovina, 2018). To prevent pain attacks in hypercholesterolemic patients, it can be done by providing foods high in antioxidants that can improve kidney performance so that they can filter well and encourage the process of purine excretion to the maximum (Rahma, 2021).

This study was conducted using Virgin coconut oil as a lycopene extractor from tomato juice to produce lycopene with the highest levels so that it can reduce total cholesterol levels in the blood (Indriani et al., 2018). The results of the study showed that after being given tomato juice and Virgin coconut oil, there was a decrease in total cholesterol and LDL levels of respondents. The nutritional content of tomato juice that can lower cholesterol is lycopene.

This study is strengthened by Adelina's study (2019), where the study was conducted by giving tomato juice which was drunk regularly 2 times a day after eating in the morning at 07.00-08.00 and in the afternoon at 15.00-16.00, which was 100 cc of tomato juice. There was an effect of cholesterol levels in the intervention group before and after giving tomato juice with a p-value of 0.001 <α 0.05. The conclusion is that there is an effect of giving tomato juice on blood cholesterol levels in hypercholesterolemic patients.

Research conducted by Niluh can conclude that Virgin coconut oil can prevent an increase in total cholesterol, triglycerides, LDL and prevent a decrease in HDL in male white rats of the Wistar strain given a high cholesterol diet. In line with research conducted by Nadia (2018) There was an average decrease of 20 mg/dl in total cholesterol levels before and after giving tomato juice. There was a significant effect on the decrease in total cholesterol before and after being given an intervention in the form of tomato juice.

According to researchers, blood cholesterol levels in respondents did not decrease much due to physical activity and irregular exercise. In respondents who do not work, physical activity is not active and can have an impact on controlling blood cholesterol levels that are not optimal. In a state of not doing physical activity that causes Lipoprotein breakdown to decrease in muscle metabolism, so that blood cholesterol levels increase. From all respondents, the results showed that the combination of tomato juice and VCO research can significantly reduce cholesterol and LDL levels with a predetermined dose of 230 ml per day and drunk 2 times a day around 20-30 mg / dL for 2 weeks.

Analysis of intervention on cholesterol and LDL levels

The results of the study showed that the average change in total cholesterol levels after the intervention was 26.10 mg/dl + 9.414 mg/dl. The results of the Paired sample Test analysis on the total cholesterol levels of respondents obtained a p-value = 0.017 <α = 0.05, so Ho was rejected and H_1 was accepted, which means that there is an effect of giving a combination of tomato juice and virgin coconut oil on total cholesterol levels. While LDL levels are known to have decreased by around 20-30 mg/dl and the results of the hypothesis test using the Parried Simple Test showed that the p-value of LDL levels was 0.000 (α <0.05), so H0 was rejected and H1 was accepted, meaning that there is an effect of giving a combination of tomato juice and VCO on LDL levels. In this study, researchers used 30 kg of tomatoes, using about 1 kg of tomatoes per day. With the addition of 30 ml of VCO, it takes about 17 bottles containing 500 ml of VCO oil. By distributing it to 20 respondents for 2 weeks.

The mechanism that allows the decrease in total cholesterol levels by lycopene which is the main carotenoid found in tomatoes. Lycopene can prevent the activity of the enzyme 3-

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hydroxy-3-methylglutaryl-CoA reductase (HMGCoA reductase) which is a key enzyme in cholesterol synthesis so that cholesterol synthesis is inhibited. The enzyme HMGCoA reductase plays a role in controlling the cholesterol biosynthesis pathway in the liver if the enzyme activity decreases it will inhibit the formation of mevalonate so that cholesterol formation will decrease. In addition, lycopene can increase the uptake and degradation of LDL by macrophages; and lycopene can increase the regulation of LDL receptors so that LDL levels in the blood can be reduced. 9-oxo-ODA is an agonist of the Peroxisome Proliferator-Activated Receptor (PPARα). PPARα is a receptor that functions in fat oxidation. Potential mechanisms for changes in tissue carotenoid accumulation due to differential fatty acid chain length and cholesterol saturation and metabolism due to dietary fat treatment. The fatty acid composition of the oil can change the solubility of carotenoids, micellization, absorption, and chylomicron formation. Carotenoids are lipophilic compounds and, once released from the food matrix, are dissolved into mixed micelles with bile salts. Medium-chain fatty acids in coconut oil can cause increased solubility of carotenoids in mixed micelles compared to long-chain fatty acids (Polazza et al, 2012).

Research conducted by Augus Venty, I Gusti Made Aman, Wimpie Pangkahila can conclude that virgin coconut oil can prevent an increase in total cholesterol, triglycerides, LDL and prevent a decrease in HDL in male white rats of the Wistar strain given a high cholesterol diet. And in line with research conducted by Nadia (2018). There was an average decrease of 20 mg/dl in LDL cholesterol levels before and after giving tomato juice. There was a significant effect on the decrease in LDL cholesterol before and after being given an intervention in the form of tomato juice.

Research conducted by Fahjar Prisiska, Supandi Tomato juice added with VCO is one of the emulsions that is good for the body to consume, this type of emulsion is an M/A emulsion (Oil in Water). (fahjar prisiska, 2019) Emulsion is a preparation in the form of a mixture consisting of two liquid phases in a dispersion system; one liquid phase is very finely dispersed in the other liquid phase, generally stabilized by an emulsifying agent (emulsifier). From research conducted by Fahjar Prisiska, Supandi Tomato juice can be made into an M/A type emulsion preparation. (fahjar prisiska, 2019).

According to researchers, this decline also occurred due to their daily activities, there are several jobs carried out by several respondents, namely from laborers, ART, and also construction workers. With these activities, it can help reduce bad fat levels in the body, in addition there are also some respondents who do not exercise so that this causes a decrease in cholesterol and LDL levels which tend to be low. Researchers also argue that age factors cannot be ignored in the emergence of various health problems. A decrease in human physiological function will occur with age. Maintaining biological, psychological, social and spiritual health is a human need throughout life. Understanding physiological changes psychologically is something that every individual must have that all humans have limits, so that changes that occur in individuals can be accepted well in facing possible problems, especially health adapted with positive coping mechanisms.

CONCLUSION

The average initial total cholesterol level of respondents was 220.15 mg/dl, after being given a combination of tomato juice and virgin coconut oil was 194.05 mg/dl. There is a significant effect of giving a combination of tomato juice and virgin coconut oil on total cholesterol levels in hypercholesterolemia patients with a p value = 0.017 (α <0.05). Respondents had high LDL levels with an average height of >150 mg/dl. After giving a combination of tomato juice and VCO, a significant decrease in LDL levels was obtained, namely 20-30 mg/dl. With the provision of intervention for 2 weeks and with a specified dose of 230 ml. So it can be concluded that there is an effect of giving a combination of tomato

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juice and virgin coconut oil on cholesterol and LDL levels.

REFERENCES

Adelina Ayu Nugraheni, M. J. (2019). Efektifitas Pemberian Jus Tomat Dan Jambu Biji Merah Terhadap Penurunan Kolesterol Total Pada Wanita Overweight. *Jurnal Riset Gizi*, 120-124.

Fahjar prisiska, s. (2019). formulasi emulsi tipe m/a perasan buah tomat (solanum lycopersicum) dengan penambahan VCO. 87.

Firman Gustaman, L. H. (2019). Pengaruh Penambahan Cremophor El Terhadap Peningkatan Laju Disolusi Tablet Simvastatin. *Journal of Pharmacopolium*, 45-52.

Hardimarta, F. P. (2020). Perbaikan Gambaran Lesi Aterosklerotik Dengan Pemberian Ekstrak Beta Vulgaris Pada Tikus Model Diet Atherogenik. *Jurnal Media Farmasi Indonesia*, 1571-1577.

Hasdianah, S. I. (2016). *Patologi dan Patofisiologi Penyaki.* Yogyakarta: Nuha Medika.

Hastuty, Yovina. D. (2018). Perbedaan Kadar Kolesterol Orang Yang Obesitas Dengan Orang Yang Non Obesitas. *urnal Kedokteran dan Kesehatan Malikussaleh*, 47-55.

Husein dkk, 2020. Program Olahraga: Kolesterol Tinggi. Yogyakarta: Citra Aji Parama.

Indriani, Enni & Ruslan, Ruslan & Prismawiryanti, Prismawiryanti & Satrimafitrah, Pasjan. (2018). KADAR LIKOPEN EKSTRAK KASAR BUAH TOMAT DALAM VCO (VIRGIN COCONUT OIL) PADA PERENDAMAN SUHU RUANG. KOVALEN: Jurnal Riset Kimia. 4. 174-179. 10.22487/kovalen.2018.v4.i2.10226.

Listiyana, A., Mardiana, M., & Prameswari, G. (2013). OBESITAS SENTRAL DAN KADAR KOLESTEROL DARAH TOTAL. *Jurnal Kesehatan Masyarakat, 9*(1), 37 - 43. doi:https://doi.org/10.15294/kemas.v9i1.2828.

Nadia, J. (2018). PENGARUH PEMBERIAN JUS TOMAT (Lycopersicum esculentum Mill) TERHADAP PENURUNAN KADAR KOLESTEROL LOW DENSITY LIPOPROTEIN (LDL) DALAM DARAH PADA PASIEN DISLIPIDEMIA RAWAT JALAN DI RSUD PROVINSI NTB. *Jurnal Gizi Prima*, 77.

Niluh Puspita Dewi, S. H. (2022). Pengaruh Pemberian Virgin Coconut Oil (VCO) Enzimatis Terhadap Kolesterol Total Tikus Putih Jantan. *Jurnal Farmasi*, 181-190.

Palozza, P., Catalano, A., Simone, R. E., Mele, M. C., & Cittadini, A. (2012). Effect of lycopene and tomato products on cholesterol metabolism. *Annals of nutrition & metabolism*, *61*(2), 126–134. https://doi.org/10.1159/000342077.

PERKI (2022). Panduan tata laksana dislipdemia. Penerbit: Perhimpunan Dokter Spesialis Kardiovaskuler Indonesia. ISBN No: 978-623-6311-36-3.

Pramesti, F. D., & Anita, D. C. (2016). *Pengaruh Pemberian Jus Tomat Terhadap Kadar Kolesterol Darah Pada Orang Dewasa (45-55 Tahun) Di Dusun Iv Ngrame Tamantirto Kasihan Bantul Yogyakarta* (Doctoral dissertation, Universitas' Aisyiyah Yogyakarta).

Prissilia. D ,dkk (2019). Profile lipid wanita menopouse di panti damai manado. jurnal e-Clinic Vol 4.

Rahma Maulidina Maghfiroh, D. H. (2021). Efektivitas Pemberian Ekstrak Daun Pepaya Jepang (Cnidoscolus aconitifolius) terhadap Kadar Kolesterol dan Struktur Histologi Aorta Mencit Hiperkolesterolemia. *Jurnal Unesa*, 89-100.

Riskesdas . (2018). *Proporsi Kadar Kolesterol Total di Indonesia*.

Sinaga, D. M. (2019). Pengaruh Pemberian VCO dan Hasil Hidrolisisnya Terhadap Kadar Gula Darah dan Profil Lipida Tikus yang Diberi Diet Tinggi Sukrosa dan Lemak. *Jurnal Farmasi*, 50-62.

Sugiyono. (2023). *Metode Penelitian Kuantitatif, R & D.* Bandung: Alfabeta.

Supriatna, Dadang, et al. "The Effect of VCO Processing Method on Blood Glucose,

DOI: https://doi.org/10.30994/sjik.v14i1.1259
ISSN: 2252-3847 (print); 2614-350X (online) Vol.14 No.1 May 2025 Page. 132-140

Cholesterol and Pancreatic Profile of Diabetic Mellitus Rats (Sprague Dawley)." *Jurnal Riset Industri*, vol. 35, no. 2, 2018, pp. 91-98, doi:10.32765/wartaihp.v35i2.3792.

Venty, A., Aman, I. G., & Pangkahila, W. (2016). Efek Pemberian Virgin Coconut Oil (Cocos nucifera) Terhadap Dislipidema Pada Tikus Putih (Rattus norvegicus) Jantan Galur Wistar Yang Diberi Diet Tinggi Kolesterol. *WMJ (Warmadewa Medical Journal)*, 2.

Vradinatika, D. S. (2020). Fungsi Tomat Sebagai Anti Aterosklerosis Dalam Pencegahan Penyakit Jantung Koroner. *Jurnal Kesehatan Pena Medika*, 21-34.

Zuhroiyyah, Siti & Sukandar, Hadyana & Sastradinanja, Sunaryo. (2017). Hubungan Aktivitas Fisik dengan Kadar Kolesterol Total, Kolesterol Low-Density Lipoprotein, dan Kolesterol High-Density Lipoprotein pada Masyarakat Jatinangor. Jurnal Sistem Kesehatan. 2. 10.24198/jsk.v2i3.11954.