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Literatur Review

Anti-Dyslipidemia Effects Of *Psidium guajava L.*

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Abstract

Backgrounds: Dyslipidemia is a clinical condition characterized by an increase in the plasma concentration of triglycerides and/or total cholesterol or its fraction relative to a reference value that is considered normal. These changes include hypertriglyceridemia due to increased synthesis of very low-density lipoprotein (VLDL), reduced triglyceride hydrolysis and/or hypercholesterolemia, due to accumulation of cholesterol-rich lipoproteins, such as low-density lipoprotein (LDL). One of the treatments for dyslipidemia besides using conventional therapy can also be done with traditional medicine or herbal medicine such as guava (Psidium guajava L.). Psidium guajava L. contains lycopene and9-oxo-ODA which has potential as an anti-dyslipidemic.

Methods: This paper uses a literature study or literature review of research articles. Search articles through Google Scholar and Pubmed with keywords used Psidium guajava L. and Dyslipidemia or Hypercholesterolemia. The criteria for articles used in the last 5 years are from 2017 to 2021.

Results: Based on the literature search, there were5studies related to the effect of Psidium guajava L. on dyslipidemia in the obesity rat model, where all studies were tested on experimental animals.

Conclusion: Based on the literature study, it was found thatPsidium guajava L.is an alternative in the treatment of dyslipidemia which has a fairly effective effect of lowering blood cholesterol (LDL and Triglycerides) levels.

Keywords: Psidium guajava, Dyslipidemia, Hypercholesterolemia

INTRODUCTION

Excess body fat or obesity is a health problem that often occurs in modern times. This happens because of an imbalance between energy intake and expenditure, resulting in excessive fat accumulation in the body[1] [2].In Indonesia, there are three diseases that cause the most death, namely stroke, coronary heart disease, and diabetes mellitus and their complications. Obesity is one of the risk factors for these diseases. In 2014, more than 1.9 billion (39%) adults aged 18 years and over worldwide were overweight and about 671 million (13%) were obese [1]. More than 50% of the 671 million obese people worldwide are in the following 10 countries based on rankings from one to ten, including: America, China, India, Russia, Brazil, Mexico, Egypt, Germany, Pakistan and Indonesia are ranked 10th in this world[3].According to the 2013 Basic Health Research (RISKESDAS) data, the prevalence of obesity in Indonesia reached 32.9%, where the Special Region of Yogyakarta (DIY) was included in sixteen provinces with obesity prevalence above the national obesity prevalence.[4].

Excess body fat (obesity) is currently an epidemic that appears throughout the world, including in developing countries[5].Excessive fat accumulation in obese patients with dyslipidemia results in an increase in the amount of free fatty acids hydrolyzed by endothelial LPL. This increase triggers the production of oxidants that have a negative effect on the endoplasmic reticulum and mitochondria. Free Fatty Acid (FFA) which is released due to excessive fat accumulation also inhibits lipogenesis, thereby inhibiting serum triacylglycerol clearance, resulting in an increase in blood TG levels and hypertriglyceridemia.[6].

Dyslipidemia conditions can affect changes in the synthesis of Very Low Density Lipoprotein (VLDL) in the liver and disturbances in Lipoprotein Lipase (LPL) resulting in an increase in TG and total cholesterol levels in the body3. In dyslipidemia there is an increase in total cholesterol levels caused by an increase in cholesterol found in VLDL and LDL due to a large increase in circulating TG, resulting in excessive fat accumulation in the body and hypercholesterolemia.[7].

Drugs such as statins, fibrates, nicotinic acid and cholesterol absorption inhibitors are often used for the treatment of dyslipidemia and its complications, but the side effects caused by long-term use of synthetic drugs and the increasing need for drugs encourage people to look for ingredients natural or traditional

ingredients (herbal plants) which have low prices and are easy to obtain as an alternative treatment.One of the natural ingredients known to reduce cholesterol levels in guava leaves and fruit (*Psidium guajava* L).

Research conducted by Wurdianing et al. (2014), showed that administration of soursop leaf extract (Annona muricata) in experimental rats induced by a high-fat diet showed changes in lipid profiles which were marked by a decrease in cholesterol levels.[8].

The results of research conducted by Adeneye and Olagunju (2009) proved that the content of saponins in papaya seeds (Carica papaya L) has an effect in lowering total cholesterol by binding to bile acids in the intestine so that the enterohepatic process does not occur.[9].

Research conducted by Diarti et al. (2018) with effect titleMelon seed flour (Cucumis Melo l.) on total cholesterol levels of male white rats (Rattus Norvegicus) wistar strain, that administration of Melon Seed Flour (Cucumis melo L.) for 14 days can reduce total cholesterol levels in male white rats. (Rattus norvegicus) Wistar . strain[10].

Based on the above background, the researchers are interested in proving the effect of guava extract (*Psidium guajava* L.) which has an effect as an antidyslipidemic (hypolipidemic) blood. *Psidium guajava* L. which has the potential to regulate lipid profiles, by reducing blood cholesterol (LDL) and triglyceride levels.

METHODS

1. Study Design

This research is a research using literature study method or literature review. A literature review is a comprehensive overview of the research that has been done on a specific topic to show the reader what is already known about the topic and what is not known, to seek rationale from research that has been done or for further research ideas.

2. Population and Sample

The data used in this study comes from the results of research that has been done (literature studies) and published in national and international online journals. In conducting this research, the researchers searched for research journals published on the internet using the Google Schoolar and PubMed search engines (table 1).

3. Study Variable

The dependent variable in this study was dyslipidemia while the

independent variable was *Psidium guajava* L. extract (*Aloe vera* L).

4. Operational Definition of Variables

Dyslipidemiarefers to unhealthy levels of one or more kinds of lipid (fat) in your blood. Blood contains 3 main types of lipids: high-density lipoprotein (HDL), low-density lipoprotein (LDL) and triglycerides

*Psidium guajava L.*is a plant thatalso called guava stone, guava siki and guava klutuk is a tropical plant originating from Brazil, distributed toIndonesiathroughThailand. Guava has green fruit with white or red flesh and has a sweet-sour taste. Guava fruit is known to contain a lot ofvitamin C

5. Data analysis

This research uses literature review method design with identification, evaluation, and interpretation of all research results related to certain topics. Methodliterature review, summarizes the results of primary research in a more comprehensive presentation of comprehensive and balanced facts.

6. Research Ethics

There is no ethical clearance in this study because it only uses literature study.

Table 1. Inclusion and Exclusion Criteria in *Literature Review*

Criteria	inclusion	Criteria	Exclusion
Period of time	Publication date for the last 5 years starting from 2017 to 2021	Article Type	The research method is not descriptive because researchers need to identify the effects of herbal plants as hypolipidemic not just a description.
Article type	International	Results	Research results that have been published and must have a p value or must be read by statistics because researchers need to see whether or not there is a relationship effect of *Psidium guajava* L. as a hypolipidemic or antidyslipidemic
Article content theme	Effect of *Psidium guajava* L. on Hypercholesterolemia OR dyslipidemia. *Psidium guajava* L. and Hypercholesterolemia/dyslipidemia		

Table 2. Study Description *Literature Review*

Name / Year	Title	Destination	Design	Sample	Results
Siti Pandanwangi, Dian Oktavian, (2018)	The Effectiveness Test of the Combination of Purple Eggplant Peel Extract (*Solanum melongena* L) and Guava Leaves (*Psidium guajava* L) as Cholesterol Lowering in White Rats (*Rattus novergicus*)	To Determine The Effectiveness And At What Dosage The Combination Extract Suspension Of Purple Eggplant Peel (*Solanum melongena* L) And Guava Leaves (*Psidium guajava*) Can Lower Cholesterol Levels In Male White Rats (Rattus Norvegicus) Induced With Propylthiouracil And Domestic Chicken Egg Yolk.	Research Design Using Experimental Laboratory With Pre And Post Test Method With Control Group Design	White Rat (*Rattus novergicus*)	That Suspension Combination of Purple Eggplant Peel Extract Suspension And Guava Leaves Can Lower Cholesterol Levels In The Blood.
Muhammad Aulia Rahman, Irfan Hamdani, Isra Thristy, Muhammad Jalaluddin Assuyuthi Chalil (2019)	Comparison of the Effectiveness of Tomato (Lycopersicum Esculantum Mill.) Juice with Red Guava (*Psidium guajava* L.) Juice on Reduction of Total Cholesterol	The Research Aims at the Effectiveness of Giving Tomato Fruit Juice With Red Guava Juice To Decrease Total Cholesterol In White	This Study Was Experimental Using Pretest Posttest With Control Group Design	White Rat (Rattus Norvegicus L.) Male 24 Wistar Strain Induced Egg Yolk 6.25gr / Kgbw, Grouped Into 4, Negative Controls	Giving Tomato Fruit Juice And Guava Fruit Juice For 2 Weeks Can Lower Total Cholesterol Levels In The Blood Of Male White Rats Of Wistar Strain Previous-

	Levels In Male White Rats Induced by Egg Yolk	Rats Induced By Egg Yolk.		Were Given Distilled Water, Positive Control Was Given Egg Yolk, One Treatment Was Given Tomato Juice 3 Cc And Two Treatment Was Administered 3 Cc Red Guava Fruit Juice For 2 Weeks Then Blood Was Taking For 3 Times, Pretest, Intervention And Posttest.	ly Induced By Egg Yolk. And Also There Is A Significant Difference In Giving Tomato Fruit Juice And Guava Juice To Reduction In Total Cholesterol Levels Of Wistar Male White Rats Induced Egg Yolk. Giving guava fruit juice has a higher level of effectiveness in reducing total cholesterol levels in male white rats of the Wistar strain compared to giving tomato fruit juice. .
Maria Evane Navy Cahaya Putri, Nita Pranitasari (2018)	Effect of Administration of Guava Extract (*Psidium guajava*) on Blood Triglyceride Levels of Male White Rats (Rattus Norvegicus) Wistar Strain Induced by Dexamethasone	To Investigate Guava (*Psidium guajava*) Contains Flavonoid Components (Quercetin) Which Has Inhibitory Activity Against Enzymes Involved In Triglyceride Synthesis So	Samples of Experimental Animals Used A total of 24 animals were divided into 3 groups	The experimental animal samples used were 24 animals divided into 3 groups: experimental animal group fed standard feed, experimental animal group induced with dexamethasone at a	Administration of Guava Extract (*Psidium guajava*) Significantly Reduced Blood Triglyceride Levels of Experimental Animals Induced by Dexamethasone Because Guavas Contain Flavonoid Components (Quercetin).

		It Can Lower Blood Tri-glyceride Levels.		dose of 0.13 mg/kg for 14 days starting on day 8, and experimental group in-duced Dex-amethasone with a dose of 0.13 mg/kg for 14 days starting on the 8th day and given guava extract with a dose of 3 gr/kg for 21 days. On Day 22, Blood Tri-glyceride Levels were Checked Us-ing the Glyc-erol Blanking Method.	
Md. Abdul-lah Al Mamun, Md. Faruk, Md. Mizanur Rahman, Kamrun Na-har, Fariha Kabir, Md Ashraful Alam, And Nusrat Sub-han	**High Carbohy-drate High Fat Diet Induced Hepatic Steato-sis And Dyslipidemia Were Amelio-rated By *Psidi-um guajava* Leaf Powder Supplementa-tion In Rats**	To Study The Effect Of *Psidium guajava* Leaf Powder Supplemen-tation On Obesity And Liver Status Using Exper-imental Rats.	Experimental rats with a total of 28 tails were divided into 4 groups	Experimental Design	Guava Leaf Powder Sup-plementation Prevents Obesi-ty, Improves Glucose Intoler-ance, And Re-duces Inflamma-tion And Oxida-tive Stress In The Liver Of Rats Given A High Carbohy-drate High Fat Diet.

Brito, A., Lima, GM, Farias, LM, Rodrigues, L., Carvalho, V., Pereira, C., Frota, K., Conde-Júnior, AM, Silva, A., Rizzo, M., Fonseca , C., Moura, RC, Santos, R., Leite, J., Santos, M., Nunes, P., Arcanjo, D., & Martins, M (2019)	**Lycopene-Rich Extract From Red Guava (*Psidium guajava* L.) Decreases Plasma Triglycerides And Improves Oxidative Stress Biomarkers On Experimentally-Induced Dyslipidemia In Hamsters**	Assessing Effects Of 28 Days Treatment With Lycopene Rich Extract (Lre) Of Red Guava Fruit (*Psidium guajava* L.) On Lipid Profile And Oxidative Stress In An Experimental Model Of Dyslipidemia	Male Hamsters (116.5 ± 2.16 G) were given 93g Ain Feed Containing Casein (20%), Coconut Fat (13.5%) and Cholesterol (0.1%).	Experimental Model Design	The Lycopene-Rich Extract From Red Guava Fruit (*Psidium guajava* L.) Promoted Hypotriglyceridemic Effect Only At 25 Mg/Kg In An Experimental Model Of Dyslipidemia In Hamsters.

RESULT

Based on the literature search, there were 5 studies related to the effect of *Psidium guajava* L. on lipid profile levels, of which there were 5 studies on experimental animals (Table2).

DISCUSSION

Based on the literature search, it was found that there were 5 studies related to the effect of *Psidium guajava* L. extract on blood cholesterol, where all the experimental studies on experimental animals varied the dosage of *Psidium guajava* L. extract used. Each test obtained from this literature study has a different dose and duration of research - different from one another.

Research conducted by Pandanwangi and Oktaviani (2018),aims toThe purpose of this study was to determine the effectiveness and at what dose the combination of purple eggplant peel extract (*Solanum melongena* L) and guava leaves (*Psidium guajava*) can reduce cholesterol levels in male white rats (Rattus norvegicus) induced with propylthiouracil and domestic chicken egg yolk. The results showed that the results of the study of reducing

cholesterol levels in male white rats showed that the combination suspension of purple eggplant skin extract (*Solanum melongena* L) and guava leaves (*Psidium guajava*) was the most effective for reducing cholesterol levels in male white rats (Rattus norvegicus). with a dose of 50mg/200gBW/day: 40mg/200gBW/day[11].

Research conducted by Rahman et al. (2019), regarding the comparison of the effectiveness of giving tomato juice with red guava fruit juice on reducing total cholesterol in white rats induced by egg yolk. The results of this study indicate that guava fruit juice has a higher level of effectiveness in reducing total cholesterol levels in Wistar male white rats compared to giving tomato juice.[12].

Research conducted by Putri and Pranitasari (2018), regardingextract effect Guava (*Psidium guajava*) contains a flavonoid component (quercetin) which has inhibitory activity against enzymes involved in triglyceride synthesis so that it can reduce blood triglyceride levels. This study showed that blood triglyceride levels in the treatment group induced by dexamethasone and given guava extract (*Psidium guajava*) decreased not significantly compared to blood triglyceride levels in the positive control group induced by dexamethasone.[13].

In the research of Mamun et al. (2019), *Psidium guajava* leaves are reported to contain many bioactive polyphenols that play an important role in the prevention and treatment of various diseases. The aim of this study was to examine the effect of *Psidium guajava* leaf powder supplementation on obesity and liver status using experimental rats. The results showed that guava leaf powder supplementation showed a significant reduction in fat accumulation in obese rats. In addition, liver enzyme function was significantly increased in mice fed a high-fat diet compared to control mice which was further improved by guava leaf powder supplementation in mice fed a high-fat diet. Administration of a high-fat diet also decreased the function of antioxidant enzymes and increased lipid peroxidation products compared to control rats. Supplementation of guava leaf powder in rats fed a high-fat diet reduced markers of oxidative stress and reestablished antioxidant enzyme systems in experimental animals. Guava leaf powder supplementation in rats fed a high-fat diet also showed a relative decrease in inflammatory cell infiltration and collagen deposition in the liver compared to rats fed a high-fat diet. This study

showed that guava leaf powder supplementation prevented obesity, improved glucose intolerance, and reduced inflammation and oxidative stress in the liver of rats fed a high-carbohydrate, high-fat diet. Supplementation of guava leaf powder in rats fed a high-fat diet reduced markers of oxidative stress and reestablished antioxidant enzyme systems in experimental animals. Guava leaf powder supplementation in rats fed a high-fat diet also showed a relative decrease in inflammatory cell infiltration and collagen deposition in the liver compared to rats fed a high-fat diet. This study showed that guava leaf powder supplementation prevented obesity, improved glucose intolerance, and reduced inflammation and oxidative stress in the liver of rats fed a high-carbohydrate, high-fat diet. Supplementation of guava leaf powder in rats fed a high-fat diet reduced markers of oxidative stress and reestablished antioxidant enzyme systems in experimental animals. Guava leaf powder supplementation in rats fed a high-fat diet also showed a relative decrease in inflammatory cell infiltration and collagen deposition in the liver compared to rats fed a high-fat diet. This study showed that guava leaf powder supplementation prevented obesity, improved glucose intolerance, and reduced inflammation and oxidative stress in the liver of rats fed a high-carbohydrate, high-fat diet. Guava leaf powder supplementation in rats fed a high-fat diet also showed a relative decrease in inflammatory cell infiltration and collagen deposition in the liver compared to rats fed a high-fat diet. This study showed that guava leaf powder supplementation prevented obesity, improved glucose intolerance, and reduced inflammation and oxidative stress in the liver of rats fed a high-carbohydrate, high-fat diet.[14].

The results of research by Brito et al. (2019), on lycopene-rich extract (LRE) from red guava fruit (*Psidium guajava* L.) on lipid profile and oxidative stress in an experimental model of dyslipidemia. Lycopene-rich extract from red guava fruit (*Psidium guajava* L.) promoted a hypotriglyceridemic effect at only 25 mg/kg in an experimental model of dyslipidemia in ham-

sters. In addition, both doses of 25 and 50 mg/kg decreased plasma levels of lipid peroxidation biomarkers, as evidenced by decreased plasma concentrations of Malondialdehyde (MDA) and Myeloperoxidase (MPO).[15].

The content of red guava fruit is vitamin C and beta carotene. So that red guava fruit can increase endurance because of the antioxidant content in it. Red guava fruit also contains fiber that contains pectin, which makes it hypocholesterolemic and hypoglycemic. This can prevent blockages in blood vessels because it can lower cholesterol levels in the blood [16].

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CONCLUSION

There is an effect of guava extract (*Psidium guajava* L.) on blood cholesterol levels in experimental animal models of hypercholesterolemia

CONFLICT OF INTEREST

The author declares that there is no conflict of interest in this study.

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