



THE EFFECT OF RED GUAVA JUICE (*PSIDIUMGUAJAVA L.*) ON LIPID PROFILE LEVELS IN SERUM

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ABSTRACT

Background: Cardiovascular disease is the highest cause of death in most developing countries. The increased cholesterol is the main cause of coronary heart disease and fatty liver disease which increases the load / burden of both diseases. One of the alternative that can decrease the cholesterol levels in long term blood plasma is using the natural ingredients such as guava fruit which is known to contain flavonoid as antioxidant that can inhibit LDL oxidation so that the levels of LDL can be decreased and atherosclerosis can be prevented as well.

Method: The type of research used in this study was experimental research using a pre-test and post-test design without a control group, then the study subjects were given 250 ml of red guava fruit juice for 14 days.

Results: The results of the study were obtained an average value before treatment (pre test) total cholesterol 204.36 mg / dl, LDL 129.08 mg / dl, HDL 58.16 and triglyceride 84.52 and the average value after treatment (post test) total cholesterol 149.88 mg / dl, LDL 82.92 mg / dl, HDL 44.2 mg / dl and triglycerides 104.28.

Conclusion: Giving red guava juice can reduce total cholesterol, LDL, HDL, and increase triglyceride levels

KEYWORDS : LDL cholesterol, Psidium guajava, Guava.

INTRODUCTION

Cardiovascular disease is the highest cause of death in most developed countries. Based on the results of the Riskesdas 2013, found the prevalence of coronary heart disease which is diagnosed the doctor as well as based on the doctor's diagnosis or symptoms is 0.5% and 1.5%.¹

2.6 million from WHO appropriate death and disability an estimated 29.7 million caused by increased levels of cholesterol. Increased cholesterol is a major cause of coronary heart disease and fat liver disease thus increasing disease burden both in developed and developing countries.² According to the results of the Riskesdas on 2013, in the population aged > 15 years old in Indonesia there were 35.9% who have a total cholesterol disorders, 15.9% have a high LDL levels, 11.9% have a high TG levels, and 22.9% have low HDL levels (< 40 mg/dl).³

Most deaths from cardiovascular disease is preventable through improvements in lifestyle such as diet, exercise, and stop smoking. For example, approximately 37% of heart attack in women is associated with excess weight. In addition, the hypercholesterolemia, which is a risk factor for cardiovascular disease can be overcome through a good diet in approximately 75% of individuals. Weight loss also affects the improvement of the production of superoxide dismutase (SOD) that prevents the oxidation of LDL. Atherosclerosis is a disease caused by the process of inflammation and abnormalities in the metabolism of fat. The understanding of the pathophysiology of atherosclerosis was originally only intended on cholesterol hypothesis. Due to the high concentration of plasma cholesterol, especially LDL cholesterol is one of the main risk factors for the occurrence of atherosclerosis. Cholesterol is a major risk factor for the occurrence of atherosclerosis. However, controversy is still going on about how high LDL concentration mechanisms can trigger the onset of atherosclerosis and its complications. The biggest possible, supported by clinical data and laboratory results, demonstrating that modified LDL by oxidation or inflammatory response triggers will glycation on artery walls, so that it will stimulate a lot of biological processes will act in the early genesis of atherosclerosis and

its complications, progression.¹ Indonesia is a rich country with natural ingredients especially plants that potentially big to be utilized and developed to its full potential. A change in attitude back to nature now this is precisely to make the utilization of medicinal plants has increased.⁴ There are various types of plants that can be used as a medicine with a variety of diseases, one of which was a guava Content.⁵ Red guava namely flavonoids also includes natural phenolic compounds are potentially as an antioxidant and has bioactivity as a remedy. Flavonoids can reliably protect the body from various degenerative diseases by means of preventing the concentration process of fat tejadinya. The role of antioxidants in red guava is very important in absorbing the effects of free radicals.⁵

The purpose of this study was to assess the effects of guava juice (*Psidium guajava L.*) on the levels of LDL cholesterol (Low Density Lipoprotein).

RESEARCH METHOD

This type of research is experimental research using the design of pre and post test only control group to determine the effect of giving red guava juice (*Psidium Guajava L.*) on lipid profiles of students medical faculty of the University Muhammadiyah Sumatera Utara.

The respondents in this study were obtained from 25 students of faculty of medicine University Muhammadiyah Sumatera Utara who were adapted to the criteria of inclusion and exclusion.

The steps of making red guava juice were washing the fruit, preparing the tools and other ingredients and then cutting the fruit to ease blending, putting 150 gram cut red guava into the blender and adding cooked water 100 cc. Once blended, pouring them into the plastic cup.

The data obtained from each parameter (variable) observations were recorded and arranged in suitable treatment. Quantitative data (the dependent variable) obtained was tested to the influence of the meaning on the treatment group influence (independent variable) with the

help of statistical program SPSS programs namely computer. Test sequence test research hypotheses and test normality. On the test of normality, test of Shapiro-wilk was used. Significant value was at $p > 0.05$ normality test. On the analysis of each group if found there distribution data that was not normal in the paired variants then used a test of Wilcoxon test as an alternative hypothesis. But if the data distribution is Gaussian then can proceed with testing hypotheses such as the paired t-test (Paired T-test).

RESULT

This research was conducted at the Faculty of Medicine University Muhammadiyah Sumatera Utara with the approval of the Commission of ethics. This type of research was experimental research using the design of pre and post test only control group over the influence the awarding of the Red guava juice (*PsidiumGuajava L.*) as many as 150 gr. Red guava and boiled water in a 100 cc 250 ml/day dosage for 14 days against lipid profile levels students faculty of medicine University of Muhammadiyah Sumatera Utara.

The respondents in this study were obtained from the students of Medicine faculty University of Muhammadiyah Sumatera Utara with totally 25 people who were adapted to the criteria of inclusion and exclusion.

Table 1. Frequency Distribution Of Respondents Based On Gender

Gender	Frekuensi (n)	Persentase (%)
Female	16	64%
Male	9	36%
Total	25	100%

Based on table 1 it can be seen that the female respondents is the largest amount namely 16 people (64%) and male respondents amounted to 9 people (36%).

Table 2 Frequency Distribution Of Respondents Based On AGE

Age	Frekuensi (n)	Persentase (%)
18-20	9	36%
21-23	16	64%
Total	25	100%

Based on table 2 it can be seen that the age group that the most plentiful are the respondents aged 21-23 years i.e. in total 16 people (64%). Followed by respondents aged 18-20 years 9 people (36%).

Table 3. Normality test Shapiro-Wilk

	ShapiroWilk	
	N	Sig
Pre test	25	0.749
Post test	25	0.637

On the test of normality Shapiro-Wilk, the p value obtained on data pre-and posts test-test each of 0.749 and 0.637. In a test of normality, the data is considered normal if the obtained value distributed $p > 0.05$. This means, distribution of data obtained by Gaussian, and then continued with the data analysis parametric test with t-test paired in group a Gaussian.

Table 4. Red Guava Juice Influence Awarding Of LDL

Lipid Profile	Pretest	Post test	Difference (mg/dl)	p value
Total cholesterol	204,36	149,88	54.48	0.0001
LDL	129.08	82.92	46.14	0.0001
HDL	58,16	44.2	13.96	0.0001
Triglycerides	84.52	104.28	-19.76	0.048

Based on the table 4, showed that the results of the research carried out the lipid profile value before treatment (pretest)

and after treatment (posttest). Obtained the average cholesterol value of the total research subjects before treatment was 204.36 mg / dl and the average cholesterol value of the total research subjects after treatment was 149.88 mg / dl. Obtained LDL mean value of the research subject before treatment was 129.08 mg / dl and the LDL mean value of the research subject after treatment was 82.92 mg / dl. Obtained the average HDL value of the research subjects before treatment was 58.16 mg / dl and the HDL mean value of the study subjects after treatment was 44.2 mg / dl. Obtained the average triglyceride value of the research subjects before treatment was 84.52 mg / dl and the average value of triglycerides in the study subjects after treatment was 104.28 mg / dl. On the test of t-test paired, considered influential if the value of $p < 0.05$. This means, there is a meaningful difference on the awarding of the Red guava juice (*PsidiumGuajava L.*) on the faculty of medicine students lipid profile levels of Muhammadiyah University Sumatera Utara.

DISCUSSION

A meaningful decline in this excellent research by giving doses of 250 ml/day for 14 days in a row, because as it has been described before that the risk for the occurrence of atherosclerosis is directly proportional to the levels of LDL cholesterol, that means when the lower levels of LDL cholesterol a person then the risk for the occurrence of atherosclerosis will be getting smaller. Based on the analysis of the results of research done before it can be concluded that the granting of a therapeutic dose of guava fruit juice 650 mg/kgBB in the form of preparations 200 ml, 30 minutes before meals for 30 days can be used as an alternative therapy for decrease LDL and total cholesterol on other sufferers. Analysis of statistical calculation by method of paired t-LDL measurement results on other sufferers after therapy. So it could be inferred that there is a meaningful difference between before and after therapy. Guava fruit rich in flavonoids, phenolic compound content of flavonoids include natural potential as antioxidants and have bioaktivitas as a remedy. Flavonoids can reliably protect the body from various degenerative diseases by means of preventing the concentration process of fat tejadnya. The role of antioxidants in red guava is very important in absorbing the effects of free radicals.⁶

Guava seeds also contain tannins, phenols, triterpen, essential oils, saponins, carotenoids, lectin, vitamins, fatty acids and fats. Guava fruit is higher in vitamin C and contains pretty much vitamin A.⁵

Flavonoids have ties difenilpropana (C3-C6-C6) are known to have properties as antioxidant, anti-inflammatory, anti-allergic, and may inhibit the oxidation of LDL (Low Density Lipoprotein). Antioxidant properties of flavonoids may reduce the risk of tumors, cancer, heart disease, strokes in humans. Flavonoids inhibit LDL oxidation is capable of quersetin by means of copper ion binding, which can induce the oxidation of LDL cholesterol.⁶

Based on table 1 it can be seen that the female respondents is aggregating the most 16 people (64%) and male respondents amounted to 9 people (36%). This is in line with the study conducted in Thailand, where most of the subject is the female as much as 70% and the male as much as 30%. The discovery of the demographics gender, researchers are looking for the subject research of healthy subjects with no previous disease conditions.⁷

Then the age of respondents by age range 18-20 years 21-23 years, and it is in accordance with previous research done that examines the effects of guava juice consumption of red on lipid profile normal young teenager, also was found to be the most age encountered in the age range 19-21 years.⁸

Previous research on the guava fruit juice reduced heart rate, systolic and diastolic blood pressure. Effects of red guava juice on systolic blood pressure in a study that shows the effects of red guava antihypertensi on the subject, there is also a vasodilator effect and antioxidant content given by the extract of guava. In patients with essential hypertension, extracts of guava added for twelve weeks can significantly lower your systolic blood pressure with a significant decrease in LDL. The results of this research also shows the effects of the depression at the heart of red guava juice. In addition, the consumption of red guava juice reduces systolic blood pressure, diastolic blood pressure, and heart rate. As the primary attention to prevention, consumption of fruit juices red guavas can improve heart health through the role of guava fruit juice in the decrease in blood pressure.⁷

Previous research stated that the fruit contains a broad spectrum of nutrients, and many of which have antioxidant properties. Phenolic substances, vitamin A, vitamin C and minerals contained in fruits showed a high antioxidant activity. These traits have been associated with decreased risk of certain degenerative diseases. Study effect on antioxidant status and lipid profile (total cholesterol, triglycerides, LDL cholesterol and HDL cholesterol) in normal teenage by consumed guava (*Psidium guajava*)⁸

Previous research on antioxidant compounds have a very important role in health. A variety of scientific evidence suggests that antioxidant compounds reduce the risk on chronic diseases such as coronary heart disease. The main character of antioxidant compounds is its ability to capture free radicals. One of the compounds found in red guava is a compound of flavonoids.⁹

Research before declaring the results obtained, it can be inferred that guava is a source of antioxidants and dietary fibre. Fruit and guava fruit extract is effective in the control of hypercholesterolemia which means that the guava has good benefits for health, reducing the risk of cardiovascular disease development. All sample animals showed decreased levels of hypercholesterolemia total cholesterol, and LDL. Antioxidants, phenolic compounds have received great attention, since substances can increase resistance to low-density lipoproteins (LDL) against oxidation. Guava has high nutritional value, with a wide range of biological activities, including antioxidant activity. Its antioxidants activity has been associated with a variety of phenolic compounds, namely: isoquercetin, myricetin, quercetin, anthocyanins, caffeic acid and ferulic acid.¹⁰

According to previous research grant of red guava juice before and after the treatment took place decrease LDL cholesterol levels. It is also caused due to the dominant role has a guava in lowering cholesterol levels with contain a variety of substances that are needed by the body, and also shows red guava juice can lower levels of total cholesterol, triglyceride and LDL on the serum. LDL cholesterol levels examination results before and after administering guava juice dose 300 grams/day in group treatment was obtained by that of the seven respondents experienced a decline in blood cholesterol levels, there is influence the granting of guava juice on the Group treatment of changes in cholesterol levels.¹⁰

Using Red guava (*Guava guajava*). Red guavas contain lots of vitamin C, which functions as an antioxidant. In addition to that guava also contains vitamin B, A, calcium, phosphorus, iron and pectin. Although it can be consumed directly, but the most high nutrients content obtained if guava made juice. The content of the nutrients contained in guava (100 mg) is CAL 49 Calories, Vitamin A2, Vitamin B1, Vitamin C, calcium, Hydrate charcoal, Phosphorus, iron, Protein, fat, and water. The content of vitamin C and pectin on guava is quite high but

vitamin C guava is higher than other fruits, mostly vitamin C guava concentrated on the skin and flesh of the outside soft and thick. In the guava, potassium to function increase the regularity of the heartbeat, activate the muscle contraction, regulate the delivery of other nutritional substances to selsel body, control fluid balance in the body's cell network, as well as lower blood pressure high (hypertension). Guava is also a source of fiber in food (dietary fiber). Fiber food beneficial to prevent atherosclerosis, heart disorders and hypertension. Granting of guava juice with doses of 300 gr/day have effect in decreasing blood cholesterol levels. Dose response is received and the granting body for each individual is different. Some of the factors relating to the effects and responses of each respondent provided guava juice, among other types of food and diet, daily activity or sport, age and gender.¹¹

Results found in accordance with the research conducted before the LDL values found on the subject which will be examined for a given red guava supplementation shows 92.4 mg/dl figure and when given the treatment be 62.2 mg/dl. The drop in the meaningful is found.¹²

On research done previously to find research on animals try to guava juice given proven weight loss, Glycemic levels, cholesterol and triglycerides in animals try if compared to the animals in the control group.¹³

The decrease in HDL levels and an increase in triglyceride levels in the blood between before and after treatment was caused by researchers who did not control food consumption in the research subjects. In accordance with a study conducted by Riva et al., There was a difference in HDL levels in blood after being given red guava fruit juice (*Psidium Guajava* L.) due to fat intake, especially saturated fat in subjects that were not controlled.¹⁴

The effect of saturated fatty acids on lipoprotein metabolism can inhibit the action of the enzyme lecithin cholesterol acyltransferase (LCAT) which plays a role in removing cholesterol from lipoproteins and tissues. This results in HDL not being formed and excessive cholesterol unable to be lifted back to the liver so that HDL and HDL levels do not function properly.¹⁵

In addition to the above, carbohydrate intake in research subjects that are not controlled can also affect the decrease in HDL levels and increase triglyceride levels in the blood. This is in accordance with the research conducted by Dwi, that the high carbohydrate in the body will increase the rate of lipogenesis and esterification of fatty acids causing a decrease in HDL levels.¹⁶

And research conducted by Shah, dietary intake and the number of foods containing high carbohydrates can cause a decrease in HDL levels due to abnormalities of lipoprotein metabolism.⁴² Thus, the possibility of these things can affect HDL levels and increase blood triglyceride levels in this study.¹⁷

From the results of the study, researchers after administration of red guava fruit juice decreased HDL levels and increased triglyceride levels. This is also in line with the research conducted by Priyanti, stating that there was an increase in total cholesterol levels, LDL levels, triglyceride levels and decreased HDL using red guava fruit extract (*Psidium guajava* L.). This is due to doses that are too small, so that the content of pectin in the extract cannot bind all cholesterol and fat in the body.¹⁸

CONCLUSION

Giving red guava juice (*Psidium Guajava* L.) 250 ml/day for 14

days with guava fruit as much as the 150 gr and mixed with boiled water 100 cc contained levels decrease total and LDL cholesterol and there are meaningful differences in total and LDL cholesterol in the blood on the subject of research.

REFERENCES

1. Rahman, Shahrul. Efek Ekstrak Buncis(*Phaseolus vulgaris* L) Terhadap Kadar LDL Dan OxLDL Serta Kaitannya dengan Polimorfisme Gen LOX-1 3'UTR188C/T Sebagai Upaya Preventif Risiko Aterosklerosis. Medan: Fakultas Kedokteran Universitas Sumatera Utara; 2014.
2. Jani Deepti K. GS. Ameliorative effect of *Raphanus sativus* and *Cassia angustifolia* in Experimentally Induced Hyperlipidemia and Cardiovascular Risk Reduction. *J PharmTech Res*; 2017; 273-279.
3. Kemenkes RI. Riset Kesehatan Dasar. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI; 2013.
4. Rahman, Shahrul. Studi Pendahuluan Pengaruh Alpukat Terhadap Profil Lemak di Poli Penyakit Dalam Klinik Iman. Medan: Fakultas Kedokteran Universitas Muhammadiyah Sumatera Utara; 2013.
5. Islamiyah, D. Pengaruh Pemberian Ekstrak Buah Jambu Biji (*Psidium guajava* L.) Terhadap Kadar Kolesterol Total, HDL, LDL, dan Trigliserida Serum Darah Tikus Putih (*Rattus norvegicus*) yang di Induksi Aloksan. [Skripsi]. Universitas Islam Negeri. Malang; 2010.
6. Astawan, IWS. Efek Jus Buah Jambu Biji (*Psidium Guajava* L.) pada Penderita Dislipidemia. Karya Tulis Ilmiah. Surabaya: Universitas Surabaya. 2013; (1):1-19.
7. Thapthimthong T., Kasemsuk T., Sibmooh N., and UnchernS.. Platelet inhibitory effects of juices from *Pachyrhizuserosus* L. root and *Psidiumguajava* L. fruit: a randomized controlled trial in healthy volunteers. Thapthimthong et al. *BMC Complementary and Alternative Medicine*; 2016.
8. RahmatAsmah, FadzellyMohd. The Effects Of Guava (*PsidiumGuajava*) Consumption On Total Antioxidant And Lipid Profile In Normal Male Youth. Faculty of Medicine and Health Science, University Putra Malaysia, 43400, Serdang, Selangor, Malaysia. Vol:6. 2006.
9. Febrianti, N., Sari Fajar R., Kadar Flavonoid Total BerbagaiJenisBuahTropis di Indonesia. Program PendidikanStudiBiologi, FKIP Yogyakarta: Universitas Ahmad Dahlan; 2016.
10. MesquitaFreire J., Maria P, Maris Stella. Effect of *Psidiumguajava* (cv. Pedro Sato) fruit and extract on the lipidemia in hypercholesterolemic rats. *Journal of Medicinal Plants Research*. Vol. 7(24) June, 2013.
11. Rahma, Afitasari Dian. Jus Jambu Biji Menurunkan Kadar Kolesterol Pada Lansia Penderita Hipertensi (Guava Juice Reduces Cholesterol Level for Elderly with Hypertension). Surabaya: UniversitasAirlangga; 2010.
12. Kumari S., RaKavi, Mangaraj M.. Effect of Guava in Blood Glucose and Lipid Profile in Healthy Human Subjects: A Randomized Controlled Study. *Journal of Clinical and Diagnostic Research*. 2016.
13. Barbalho Sandra M., Machado Flavia M. V. Farinazzi. *Psidium Guajava* (Guava) : A Plant of Multipurpose Medicinal Applications. Barbalho et al., *Med Aromat Plants* 2012.
14. Riva Mustika Anugrah, Kusmiyati Tjahjon, Martha Irendi Kartasurya. Jus Buah Jambu Biji Merah (*Psidium guajava* L.) Dapat Menurunkan Skor Atherogenic Index of Plasma. Departemen Ilmu Gizi Fakultas Kedokteran Universitas Diponegoro, Semarang. 2017.
15. Arai Y, Wanatabe S, Kimira M., Shimoi K., Mochizuki R., Kinze N. Dietary intake of Flavonols, Flavones and Isoflavones by japanese women and the inverse correlation between quercetin intake and plasma ldl cholesterol contrentation. *Journal of Nutrition*. 2000; 130 : 2243-2250.
16. Dwi RSN. Hubungan asupan karbohidrat dan lemak dengan kadar profil lipid pada pasien jantung koroner rawat jalan diRSUD Dr. Moewardi Surakarta. Naskah Publikasi Universitas Muhamddiyah Surakarta. 2015
17. Shah S,S, Gaurang B,S. Satbeer D, S. Efficacy of piperine in the regulation of Obesity-Induced Dyslipidemia in High-Fat Diet Rats. *Indian Journal of Pharmacology*. 2011
18. Priyanti, L. Pengaruh Pemberian Ekstrak Daun Salam (*eugenia polyantha*) Terhadap Kadar hdl, ldl, dan Kolesterol Total Serum tikusjantan galur wistar hiperlipidemia, semarang:universitas diponegoro. 2011