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EFFECT of ADMINISTRATION of BAY LEAF EXTRACT (*Eugenia polyantha*) on TOTAL CHOLESTEROL and TRIGLYCERIDE LEVEL S IN PATIENTS WITH HYPERTENSION and TYPE 2 DIABETES MELLITUS AT IMAN CLINIC MEDAN

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ABSTRAK

Kolesterol merupakan komponen lemak yang berfungsi sebagai komponen stabilisasi membrane sel dan prekusor garam empedu dan hormone steroid. Enzim HMG-CoA reduktase memiliki peran penting dalam proses sintesis kolesterol. Trigliserida adalah lemak utama yang terdapat di dalam makanan yang mengalami emulfikasi di usus halus oleh garam empedu dan dicerna oleh lipase. Flavonoid dalam daun salam akan berekasi dengan gugus hidroksil pada kolesterol. Saponin akan meningkatkan pengikatan kolesterol di oleh serat. Tanin dapat menghambat penyerapan lemak di usus. Penelitian ini meneliti pengaruh pemberian ekstrak daun salam (Eugenia polyantha) terhadap kadar kolesterol total dan trigliserida pada pasien Prolanis. Penelitian ini adalah Quasi experimental design dengan rancangan "non equivalent control group/non randomized control group pretest posttest design". Berdasarkan hasil uji hipotesa dengan uji Paired T-test dan uji Wilcoxon, tidak terdapat pengaruh pemberian ekstrak daun salam terhadap kadar kolesterol total dan trigliserida dengan P-value < 0.05. Tidak terdapat pengaruh pemberian ekstrak daun salam (Eugenia polyantha) terhadap kadar kolesterol total dan trigliserida pada pasien Prolanis.

ABSTRAK

Effect of Administration of Bay Leaf Extract (Eugenia Polyantha) on Total Cholesterol And Triglyceride Level S In Patients With Hypertension And Type 2 Diabetes Mellitus At Iman Clinic Medan. Cholesterol is a fat component that stabilizes cell membranes and is a precursor of bile salts and steroid hormones. The HMG-CoA reductase enzyme has an important role in the cholesterol synthesis process. Triglycerides are the primary fats found in food that undergo emulsification in the small intestine by bile salts and are digested by lipase. The flavonoids in bay leaves will react with the hydroxyl groups in cholesterol. Saponins will increase the binding of cholesterol to fiber. Tannins can inhibit fat absorption in the intestine. This study examined the effect of administering bay leaf extract (Eugenia polyantha) on total cholesterol and triglyceride levels in patients with hypertension and Diabetes mellitus type 2 in Clinic Iman Medan. This research is a Quasi-experimental design using 32 samples consisting of 16 samples from the control group and 16 from the experimental group. This study used bay leaf extract in 200 mg bay leaf capsules with 3 doses given to each group. Based on the results of the hypothesis test using the Paired T-test and Wilcoxon test, giving bay leaf extract had no effect on total cholesterol and triglyceride levels with a P-value < 0.05. There was no effect of giving bay leaf extract (*Eugenia polyantha*) on total cholesterol and triglyceride levels in patients with hypertension and DM type 2.

INTRODUCTION

Dyslipidemia is a lipid profile disorder due to disturbances in lipid metabolism or plasma lipid transport or impaired synthesis and degradation of plasma lipoproteins, which is characterized by an increase in total cholesterol levels, triglycerides (TG), low-density lipoprotein (LDL), and a decrease in the rate High-density lipoprotein (HDL). Increasing total cholesterol and triglyceride (TG) levels will cause plaque formation in the blood vessels or atherosclerotic plaque, called atherosclerosis. Atherosclerosis is a risk factor for the occurrence of heart and blood vessel diseases, such as coronary heart disease (CHD) and stroke.[1] Based on data from WHO (World Health Organization) in 2008, the world prevalence of increased total cholesterol levels in adults was 39%, with a division of 37% for men and 40% for women. The WHO also said that elevated cholesterol levels increase the risk of heart disease and stroke and are estimated to cause about 2.6 million deaths.[2]

The prevalence of dyslipidemia in Indonesia based on 2018 RISKESDAS data in the population aged ≥15 years is 28.8% with a total cholesterol level above 200 mg/dl with more sufferers in urban residents compared to villagers and more women than men.[3,4] As for the prevalence of heart disease in North Sumatra based on the North Sumatra Province RISKESDAS in 2018, which is assessed based on clinical parameters guidelines National Cholesterol Education Program - Adult Treatment Panel III (NCEP-ATP III) which includes checking the level of total cholesterol, triglycerides (TG), low-density lipoprotein and High-density lipoprotein Data on heart disease patients diagnosed by doctors in the population of all ages and age ranges of 35 years and above has significant numerical differences, namely age 35-44 years (1.15%), age 45-54 years (2.74%), age 55-64 (3.68%), age 65-74 (5.29%), age 75 and later (4.78%). By gender, women suffer from heart disease more (1.49%) compared to men (1.16%) and urban residents (1.40%) more than rural residents (1.25%).[5,6]

Leaf Salam (Eugenia polyantha) is a herb and spice plant widely found in Indonesia. Bay leaves are widely used by the Indonesian people not only as a spice to flavor food but also as an alternative medicine in the form of herbal medicine because they are easy to get and have cheap economic value.[7] Bay leaves have several ingredients; the main content of bay leaves is in the form of flavonoids that can prevent the formation of fat deposits in the walls of blood vessels. Other ingredients of bay leaves, such as tannins, saponins, essential oils, vitamin A, vitamin C, vitamin E, vitamin B3, and fiber.[8] Regarding the administration of bay leaf extract to patients with type 2 diabetes mellitus for one week with a dose of 1000 mg/day, the results of the average difference in total cholesterol levels before and after administration of bay leaf extract to patients with type 2 diabetes mellitus were obtained.[9,10]

Regarding the administration of bay leaf extract to hypertensive patients, there is an effect on the administration of bay leaf (Syzygium polyanthum) in hypertensive patients because bay leaf contains flavonoids that can reduce systemic vascular resistance (SVR). Renin-angiotensin System (RAS), which causes a decrease in blood pressure. The essential oils contained play a role in providing a relaxing effect, and regularly consuming bay leaf decoction can help the kidneys excrete excess fluid and salt, which helps lower blood pressure.[11]

In another study regarding the administration of bay leaf extract against total cholesterol and LDL serum of rats conducted by Tania et al (2018), it was stated that bay leaves contain flavonoids and tannins that can reduce cholesterol levels by inhibiting HMG-CoA Reductase and inhibiting the absorption of fat in the intestines.[12] Based on previous research on the administration of bay leaf extract to see its effect on cholesterol levels and other lipid profiles, researchers

personally want to conduct more specific research on the effect of the administration of bay leaf extract on total cholesterol and triglyceride levels in people with chronic diseases such as hypertension and type 2 diabetes mellitus.

Therefore, this study will be conducted at the Iman Clinic, which has Prolanis (Chronic Disease Management Program) patients, to research how giving bay leaf extract (Eugenia polyantha) affects total cholesterol and triglyceride levels.

METHOD

This research was carried out at the Martubung Faith Clinic, Medan City, based on the approval of the Ethics Commission Number: 904/KEPK/FKUMSU/2022. The research was carried out in October 2022-December 2022. The research design used is quasi-experimental with a "nonequivalent control group/nonrandomized control group pretest-posttest design" to see the effect of giving bay leaf extract to Prolanis patients at the Iman Clinic. Administration 3 times a day for one month in the experimental group and using a placebo containing brown rice flour in the control.

This study used 32 patient samples using the purposive sampling method. The sample was divided into two groups, namely 16 samples in the experimental group and 16 in the control group, each meeting the inclusion and exclusion criteria. The inclusion criteria in this study were Prolanis hypertensive and diabetes mellitus patients who agreed to informed consent to participate in the study, ≥ age 45 years, and consumption of bay leaf extract capsules 70% of the total number of capsules. Meanwhile, this study's exclusion criteria are patients with a history of drinking cholesterol and patients who do not return to the faith clinic after a maximum of 7 days of giving bay leaf extract. Patients who use herbal medicines other than bay leaf extract and patients with memory impairment without guardians. The data collected is primary data obtained directly from the results of interviews and the results of examinations of total cholesterol levels and triglyceride levels of prolanis patients with hypertension and type 2 diabetes mellitus at the Iman Clinic, Medan.

All data obtained and collected in this study will be analyzed using a computer-based statistical analysis test, namely using SPSS (Statistical Product and Service Solution) in the form of univariate and bivariate analysis. Data analysis using the paired T-test if the data is distributed normally ($p > 0.05$); if the data distribution is abnormal ($p < 0.05$), the Wilcoxon test will be carried out. The p-value of the bivariate analysis shows a meaningful relationship if ($p <0.05$), which means that H0 is rejected (both variables are related).

RESULT

The results of the study were obtained from 16 respondents of the experimental group used for the research (Table 1); information was obtained from the respondents of male gender 6 respondents with a percentage of 37.5%, while respondents who had female gender 10 respondents, with a percentage of 62.5%. Meanwhile, at the age of 45-54, there were 2 respondents with a percentage of 12.5%, 5 with a percentage of 31.3%, and 4 with a percentage of 25% who were>75 years old.

Table 1. Control Group Sample Frequency Distribution

Respondent characteristics		N	%
Gender	**Man**	3	18.8
	Woman	13	81.2
Total		16	100.0
Age	**45-54 years old**	2	12.5
	55-64 years old	5	31.3
	65-74 years old	9	56.3
	≥ 75 years	0	0
Total		16	100.0

The results of the study were obtained from 16 respondents in the control group used for the study, from the 16 respondents used in the study, information was obtained that the respondents who had male gender were 3 respondents with a percentage of 18.8%, while the respondents who had a female gender were 13 respondents with a percentage of 81.2%. Meanwhile, at the age of information, information was obtained that 2 respondents were 45-54 45-54 years old with a percentage of 12.5%, respondents who had 55-64 years old, as many as 5 respondents with a percentage of 31.3%, respondents who had 65-75 years old as many as 9 respondents with a percentage of 56.3% and respondents who had >75 years old as many as 0 respondents with a percentage of 0% (Table 2).

Table 2. Experimental Sample Frequency Distribution

Characteristics of Respondents		N	%
Gender	Man	6	37.5
	Woman	10	62.5
Total		16	100.0
Age	45-54 years old	2	12.5
	55-64 years old	5	31.3
	65-74 years old	5	31.3
	≥ 75 years	4	25
Total		16	100.0

Table 3 shows that the average pretest cholesterol levels in the experimental group were 193, while the average value of posttest cholesterol levels in the experimental group was 199.62. The mean difference was -6.62; the value was negative, so information was obtained that there was an increase in the average value of posttest cholesterol levels of 6.62. At cholesterol levels, the Sig. Value was obtained of 0.776 > 0.05.

Table 3. Results of the Overall Hypothesis Test of the Experimental Group

Variable	Mean	Mean Difference	Sig.
Pretest Cholesterol Levels	193	-6.62	0.776
Posttest Cholesterol Levels	199.62		
Triglyceride Pretest Levels	141.81	-3.69	0.852
Posttest Triglyceride Levels	145.50		

Thus, it can be concluded that the average cholesterol levels of the pretest and posttest in the experimental group are not significantly different, which means that there is no effect of the administration of bay leaf extract (Eugenia polyantha) on cholesterol levels in the experimental group. Meanwhile, the pretest triglyceride value in the experimental group was 141.81, while the average posttest triglyceride value was 145.50. The mean difference was -3.69. The value was negative, so information was obtained that there was an increase in the average value of triglycerides posttest by 3.69. In addition, at the triglyceride level, the Sig. Value was obtained as much as 0.852 > 0.05. Thus, it was concluded that the average triglyceride levels of pretest and posttest in the experimental group were not significantly different, meaning that there was no effect of administration of bay leaf extract (Eugenia polyantha) on triglyceride levels in the experimental group. Table 4 shows that the average pretest cholesterol level value in the control group was 207.94, while the average posttest cholesterol level value in the control group was 224.56. The mean difference was -16.62; the value was negative, so information was obtained that there was an increase in the average value of posttest cholesterol levels of 16.62.

Table 4. Results of the Overall Hypothesis Test of the Control Group

Variable	Mean	Mean Difference	Sig.
Pretest Cholesterol Levels	207.94	-16.62	0.069
Posttest Cholesterol Levels	224.56		
Triglyceride Pretest Levels	157.62	-17.51	0.083
Posttest Triglyceride Levels	175.13		

In addition, the cholesterol level obtained a Sig. value of 0.069 > 0.05. Thus, it can be concluded that the average cholesterol levels of pretest and posttest in the control group are not significantly different, meaning there is no effect of placebo administration on cholesterol levels in the control group. Meanwhile, the pretest triglyceride value in the control group was 157.62, while the average posttest triglyceride value was 175.13. The mean difference was -17.51. The value was negative, so information was obtained that there was an increase in the average score of triglycerides posttest by 17.51. In addition, at triglyceride levels, Sig. values of 0.083 > 0.05 were obtained. Thus, it can be concluded that the average triglyceride levels pretest and posttest in the control group are not significantly different, meaning there is no effect of placebo administration on triglyceride levels in the control group.

Based on Table 5, information was obtained in the experimental group that triglyceride levels aged 45-54 years had a P-value of 0.180, 55-64 years old had a P-value of 0.686, 65-74 years old had a P-value of 0.715 and ≥75 years had a P-value by 1, the value is greater than the significance level (α) = 0.05, meaning that there is no significant difference in the triglyceride levels of respondents in all vulnerable ages of 45 to ≥ 75 years in the experimental group. In the control group, triglyceride levels aged 45-54 years had a P-value of 0.180, 55-64 years old had a P-value of 0.043, 65-74 years old had a P-value of 0.906, the value was greater than the significance level (α) = 0.05, meaning that there was no significant difference in the triglyceride levels of respondents in vulnerable ages of 45-54 years and 65-74 years in the control group. However, vulnerable age groups aged 55-64 years have a P-value smaller than the significance level (α) = 0.05, meaning there is a significant difference in respondents' triglyceride levels in vulnerable age groups of 55-64 years.

Table 5. Triglycerides By Age Range

Age	Triglycerides					
	Experiment		P-value	Control		P-value
	Pre	Post		Pre	Post	
45-54 Years	130.5	149	0.180	135	170	0.180
55-64 Years	94	98	0.686	165	188.40	0.043
65-74 Years	157.40	148.20	0.715	158.55	168.889	0.906
≥ 75 Year	79	85	1	-	-	-

Based on Table 6, information was obtained in the experimental group that cholesterol levels aged 45-54 years had a P-value of 0.444, 55-64 years old had a P-value of 0.680, 65-74 years old had a P-value of 0.711 and ≥75 years had a P-value of 0.103, this value is greater than the significance level (α) = 0.05, meaning that there is no significant difference in the total cholesterol levels of respondents in all vulnerable ages 45 to ≥ 75 years in the experimental group. In the control group, cholesterol levels aged 45-54 years had a P-value of 0.934, 55-64 years old had a P-value of 0.788, 65-74 years old had a P-value of 0.069, this value was greater than the significance level (α) = 0.05, meaning that there was no significant difference in the total cholesterol levels of respondents in all vulnerable ages 45 to 74 years in the control group.

Table 6. Total Cholesterol By Age Range

Age	Total Cholesterol					
	Experiment		P-value	Control		P-value
	Pre	Post		Pre	Post	
45-54 Years	141	172	0.444	193	194.5	0.934
55-64 Years	130	159	0.680	223.6	226.40	0.788
65-74 Years	209.80	217.2	0.711	202.55	230.222	0.069
≥ 75 Year	189.25	178.75	0.103	-	-	-

Based on Table 7, information was obtained in the experimental group that the triglyceride level in the male sex had a P-value of 0.753, in the female sex had a P-value of 0.959, the value was more significant than the significance level (α) = 0.05, meaning that there was no significant difference in the triglyceride levels of the respondents in the male and female sexes in the experimental group. In the control group, the triglyceride level in the male sex had a P-value of 0.004. The value was smaller than the significance level (α) = 0.05, meaning that there was a significant difference in the triglyceride level of the male respondents in the control group.

Table 7. Triglyceride Levels By Gender

Gender	Triglycerides					
	Experiment		P-value	Control		P-value
	Pre	Post		Pre	Post	
Man	154.5	129.83	0.753	131	154	0.004
Woman	134.20	154.90	0.959	163.76	180	0.227

Based on Table 8, information was obtained in the experimental group that the total cholesterol level in the male sex had a P-value of 0.482, the female sex had a P-value of 0.410, the value was greater than the significance level (α) = 0.05, meaning that there was no significant difference in the total cholesterol level of the respondents in the male and female genders in the experimental group. In the control group, the total cholesterol level in the male sex had a P-value of 0.593, while in the female sex had a P-value of 0.033, the value was smaller than the significance level (α) = 0.05, meaning that there was a significant difference in the total cholesterol level of female respondents in the control group.

Table 8. Cholesterol Levels By Gender

Gender	Total Cholesterol					
	Experiment		P-value	Control		P-value
	Pre	Post		Pre	Post	
Man	174.5	180.83	0.482	191.667	184	0.593
Woman	204.10	210.90	0.410	211.69	233.92	0.033

DISCUSSION

This study aims to determine the effect of giving bay leaf extract on total cholesterol and triglyceride levels of Prolanis patients at the Iman Clinic in 2022. Data was obtained based on samples that met the criteria by conducting intravenous checks of total cholesterol and triglyceride levels. The data obtained were then analyzed using the bivariate analysis method. The data obtained is quantitative data, so to achieve the objectives of this study, an appropriate analysis method is carried out, namely the Paired T-Test. However, the Paired T-Test has an assumption that must be met, namely the normality of the data. If the assumption of data normality is not met, then the alternative analysis is to use the Wilcoxon test.

Based on the research results, the administration of bay leaf extract does not affect total cholesterol and triglyceride levels in Prolanis patients with hypertension and type 2 DM at the Iman Clinic based on age range. This can be known based on the total cholesterol P-value value of 0.444 at 45-54 years old. The value is greater than the significance level (α) = 0.55.

Based on the study results in the age range of ≥ 75 years in the experimental group, there was an average decrease in total cholesterol levels from a pretest value of 189.25 to a posttest indigo of 178.75. However, there was no significant difference based on a P-value of 0.103. Age is one of the factors that characterize individuals from biological factors.

Based on the study results in the age range of 65-74 years in the experimental group, there was an average decrease in triglyceride levels from a pretest value of 157.40 to a posttest indigo of 148.20. However, there was no significant difference based on a P-value of 0.715.

Age is one of the individual characteristics of biological factors that impact changes in lipid profiles, such as total cholesterol (TC) and triglycerides (TG). In addition, an increase in glucose levels in people with diabetes as a result of insulin dysfunction, such as in Prolanis patients, is related to lipid profile abnormalities, which can increase triglyceride levels and decrease HDL levels due to the influence of the metabolism of most biomolecules in the body, in the form of increased secretion of very low-density lipoprotein (VLDL).

Bay leaf (Eugenia polyantha) has several flavonoids, tannins, and saponins. In several studies conducted in vitro, flavonoids contained in bay leaves showed a decrease in cholesterol synthesis due to their action as an inhibitor of the HMG-CoA reductase enzyme. Flavonoids are a group of plant polyphenols that are divided into several main subclasses, such as flavones, flavonols, flavanols, flavanons, isoflavones, and anthocyanins. Flavonoids have several roles in the modulation of lipid metabolism, such as the absorption of lipids and carbohydrates. Cholesterol and triglyceride levels are greatly influenced by intake and diet, such as the intake of foods rich in animal fats and carbohydrates.[13] In the body, excess carbohydrates will be converted into Free Fatty Acid (FFA), which will be stored in the body as triglycerides.

The effects of flavonoids on cholesterol and triglyceride levels have shown consistent results. However, some further research is needed on dosage variations or the bioavailability of flavonoids to see which concentrations can achieve a normal human diet without supplementation. Cholesterol levels come from two sources: food intake of 30 percent and synthesis in the liver of 70 percent. In addition, genetics influence plasma cholesterol levels, which affect the absorption of cholesterol in the intestines. [14] The rs17725246 allele in NPC1L1 in individuals at risk of having the allele will affect cholesterol absorption in the intestine and increase cholesterol levels in the plasma due to encoding against the membrane multipass.

Based on the results of the research that has been conducted, the administration of bay leaf extract does not affect total cholesterol and triglyceride levels in Prolanis patients at the Iman Clinic based on gender.[15] This can be known based on the total cholesterol P-value of 0.482 males, which is greater than the significance level (α) = 0.55. In other words, there was no difference in the average total cholesterol level of Prolanis patients at the Iman clinic before and after administering bay leaf extract. The same results were obtained for total cholesterol levels in the female sex, with a total cholesterol P-value of 0.410 for the female sex; the value was greater than the significance level (α) = 0.55. This could not prove the effectiveness of bay leaves in reducing total cholesterol and triglyceride levels in Prolanis patients at the Iman Clinic.[16]

Based on the results of the study on the male sex in the experimental group, there was a decrease in the average triglyceride level from a pretest value of 154.5 to a posttest indigo of 129.83. However, there was no significant difference based on a P-value of 0.753.

Sex is one of the common factors that are often attributed to the cause of cardiovascular disease.[17] Cardiovascular diseases have correlations that vary by gender.[18] In the male sex, total cholesterol and LDL are greatly influenced, while in the female sex, triglyceride and HDL levels are affected. Based on the NHANES survey from 2013 to 2014,[19] data was obtained that men had a higher total cholesterol intake compared to women with cholesterol intake above 300mg/day.[20]

The limitations of this study are that it does not follow up on the sample when consuming bay leaf extract for one month and does not regulate the diet of the sample. In this study, there was no survey of patient compliance with consuming bay leaf extract. Research on the effects of deep leaf extract with several different therapeutic doses, with a larger sample with a longer duration, is needed.

CONCLUSION

Based on the results of the analysis and discussion that has been carried out, the conclusion was reached that giving bay leaf extract had no effect on total cholesterol and triglyceride levels in prolanis patients with hypertension and type 2 DM at the Iman clinic in 2022. In other words, there was no difference in the average total cholesterol and triglyceride levels of Prolanis patients with hypertension and type 2 DM at the Iman clinic before and after administration of bay leaf extract. These results could not prove the effectiveness of bay leaves in lowering cholesterol levels in Prolanis patients at the Iman Clinic.

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