

RESEARCH ARTICLE

Administration Of Emprit Ginger Extract (*Zingiber Officinale* Rosc.) Effect On Cholesterol Reduction In Students Suffering From Hypercholesterolemia

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Abstract: Hypercholesterolemia is one of the lipid disorders that is usually characterized by an increase in cholesterol levels in the blood to above 200 mg/dL. The prevalence of hypercholesterolemia in the world is around 45% while in Southeast Asia it is around 30% and in Indonesia it reaches 35%. Currently, people with hypercholesterolemia are not only adults or the elderly, but many children and adolescents have experienced hypercholesterolemia due to their lifestyle. Emprit ginger (*Zingiber officinale* Rosc.) or small ginger is a ginger used for spices, beverage raw materials, and herbal medicine. The main ingredients in ginger are shogaol and gingerol which are flavonoid compounds. The decrease in cholesterol levels is influenced by flavonoid and polyphenol compounds that prevent free radicals, have a hypocholesterol effect that inhibits the enzyme HMG-CoA reductase. This study aims to find out whether ginger emprit can lower cholesterol levels in students suffering from hypercholesterolemia. The research method used was quantitative with a research design using pre-experimental (pretest and posttest) on 61 people suffering from hypercholesterolemia and a statistical wilcoxon test will be performed. It was found that 61 students had hypercholesterol and 36 of them had decreased to normal after consuming emprit ginger extract. This result is supported by statistical analysis using the Wilcoxon method with a p-value of 0.000 ($p < 0.05$). It can be concluded with a p-value of 0.000 that the administration of emprit ginger extract has the potential to have a significant influence on students suffering from hypercholesterolemia.

Keywords: Hypercholesterolemia, emprit ginger, cholesterol

INTRODUCTION

Cholesterol is one of the components of fat, while fat is one of the energy sources that provides the highest calories. Apart from being a source of energy, fat is also an important component in the human body. Cholesterol levels in the body must be kept within normal limits. High cholesterol in the body or hypercholesterolemia can lead to atherosclerosis. The higher a person's cholesterol level, the greater the incidence of atherosclerosis.^{1,2}

Hypercholesterolemia is one of the lipid disorders that is usually characterized by an increase in cholesterol levels in the blood up to above 200 mg/dL.² The prevalence of hypercholesterolemia in the world is around 45% while in Southeast Asia it is around 30% and in Indonesia it reaches 35% (Ministry of Health of the Republic of Indonesia; Balitbangkes; WHO). Hypercholesterolemia is a risk factor for various diseases such as stroke, coronary heart disease, obesity, hypertension and others. Currently, hypercholesterolemia sufferers are not only adults or the elderly, but many children and adolescents have hypercholesterolemia due to their lifestyle.³

Hypercholesterolemia in Indonesia in the age group of 65-74 years is 38.2% and decreases slightly in the age group over 75 years of age, which is 32.9%, while in students it is around 10-11% and increases in adolescents who are obese around 23-40%.² In recent years, several herbal remedies have been found to lower cholesterol levels in the body such as dutch teak leaves, Chinese teak

leaves, tempuyung leaves, green tea leaves, curcuma rhizomes, turmeric rhizomes and ginger.^{4,5} In Indonesia, there are three types of ginger, namely red ginger, elephant ginger and emprit ginger.⁵

The compounds found in ginger are volatile and non-volatile compounds. Volatile compounds contain terpenoids while non-volatile compounds contain gingerol, shogaol, zingerone as well as flavonoid compounds and polyphenols that have antioxidant effects and prevent the presence of free radicals in the body.⁶ The main ingredients in ginger are shogaol and gingerol which are flavonoid compounds. The decrease in cholesterol levels is influenced by flavonoid and polyphenol compounds that prevent free radicals, having a hypocholesterol effect that inhibits the enzyme HMG-CoA reductase.⁷

Emprit ginger (*Zingiber officinale* Rosc.) or small ginger is ginger used for spices, beverage raw materials, herbal medicine and food flavoring.⁸ As we know emprit ginger (*Zingiber officinale* Rosc.) has many properties including being able to be a mixture of herbal medicines such as appetite enhancer, menstrual decay, lowering blood pressure, gastric tonic, phlegm decay, nausea prevention, increasing stamina, preventing wound infections, lowering cholesterol levels, relieving fatigue,⁹ and protection of kidney damage due to Pb acetate.¹⁰ Ginger emprit (*Zingiber officinale* Rosc.) It is also a natural ingredient that contains active phenolic components such as gingerol, shogaol, and zingerone that have

antiinflammatory, antioxidant, anticarcinogenic and analgesic activity.^{11,12} Previous research examined the administration of red ginger extract to women during the climacterium of menopause by giving 10 grams of red ginger extract twice a day for 14 days and can reduce average cholesterol levels by 22mg/dL.¹²

This study aims to find out whether ginger emprit can lower cholesterol levels in students suffering from hypercholesterolemia

METHOD

The type of research used is quantitative research with a pre-experimental research design (pretest and posttest). Ethical approval was obtained from the Health Research Ethics Commission, Faculty of Medicine, University of Muhammadiyah North Sumatra No. 957/KEPK/FKUMSU/2022. This research was carried out in March 2023 - June 2023 at the Faculty of Medicine, University of Muhammadiyah North Sumatra. Inclusion criteria: Hypercholesterolemia, willing to sign informed consent, Student of the Faculty of Medicine, University of Muhammadiyah North Sumatra. Exclusion criteria: Students who are taking hypercholesterol drugs, students with gastrointestinal diseases, and students with ginger allergies. Data analysis was carried out by means of univariate and bifariate analysis. Univariate analysis aims to describe the characteristics of

respondents. Bivariate analysis to analyze two data groups consisting of dependent and independent variables. Normality and homogeneity tests were carried out before bivariate analysis was carried out. The type of test used is the Paired T-Test. The Paired T-Test is used to find out if there is a difference in mean cholesterol levels before and after the administration of emprit ginger extract. To anticipate abnormal data, an alternative test will be carried out, namely the Wilcoxon test.

RESULT

Table 1. Respondent Age

Age	Frequency (n)	Percentage (%)
18 y.o	1	1.67
19 y.o	2	3.33
20 y.o	8	13.33
21 y.o	2	3.33
22 y.o	41	68.33
23 y.o	6	10.00
Total	60	100

In accordance with table 1, the age of 22 years dominated in this study, which was 41 students (68.33%).

Table 2. Respondent Gender

Gender	Frequency (n)	Percentage (%)
Man	15	25
Woman	45	75
Total	60	100

Based on gender, it was found that the female gender dominated in this study, namely with a total of 45 students (75%).

Table 3. Cholesterol Before and After Giving Emprit Ginger

	Kolesterol	Frequency (n)	Persentase (%)
Pre-test	Normal	0	0
	Hight	60	100.0
Post-test	Normal	36	60
	Hight	24	40.0

Table 4.3 above shows that before the administration of emprit ginger extract (pretest), no students were in the "Normal" category for cholesterol levels, and all (100.0%) were in the "High" category. However, after the administration of emprit ginger extract (posttest), there was a change in the distribution of cholesterol categories. The percentage of students who fall into the "Normal" category increased to 60.0%, while the percentage of students in the "High" category dropped to 40.0%.

In this section, the effect of giving emprit ginger extract on students suffering from hypercholesterolemia will be tested. The criteria for decision-making based on the value of probability or intrinsic value (*Sig.*) are: "If the significance value of $> \alpha = 0.05$, then H_0 is accepted, while if the significance value is $\leq \alpha 0.05$, then H_0 is rejected". The results of hypothesis testing using *Wilcoxon* with the help of statistics are as follows:

Table 4. Wilcoxon Test Results

Treatment	Group	AV	P-Value	Conclusion
Ginger Emprit	Pretest	221. 017	0.000	Effective
	Posttest	201. 283		

Based on the results of *the wilcoxon* test presented in table 4.5, a p-value of 0.000

(<0.05) was obtained . Thus, it can be stated that there is an effect of giving emprit ginger extract (*Zingiber officinale* Rosc.) on the reduction of cholesterol in students suffering from hypercholesterolemia.

DISCUSSION

Based on the results of the research that has been carried out, it shows that emprit ginger extract is effective in reducing cholesterol levels in students of the Faculty of Medicine, University of Muhammadiyah North Sumatra, this is evidenced by testing using *Wilcoxon* which obtained a significance (*p-value*) of 0.000 ($p < 0.05$). In addition, it is also proven by most students, namely 36 students (60%) have normal cholesterol after consuming emprit ginger extract.

The results of this study are supported by a previous study conducted by Suharto, I., P., S. on patients with diabetes mellitus, which showed a decrease in the average value of total cholesterol levels in the group given ginger boiled water. The average cholesterol dropped from 200 mg/dL to 190.5 mg/dL and there was a difference in total cholesterol before and after ginger boiled water.¹³

Another study conducted by Siti Mahmudah with the effect of red ginger extract on total cholesterol levels in women during the climacterium of menopause showed a decrease with an average total of 22 mg/dL.¹²

The mechanism of action of gingerol to reduce serum lipids is by inhibiting

lipoprotein lipase in adipose tissue, and increasing LDL receptors in the liver. The activity of lipoprotein lipase causes the formation of free fatty acids (*Free Fatty Acid* / FFA) which is one of the main elements to form *Very Low Density Lipoprotein* (VLDL) particles in the liver. This inhibition of FFA is due to a reduction in VLDL particles in hepatocytes which leads to a decrease in the synthesis of *Intermediate Density Lipoprotein* (IDL) and LDL particles in the blood. By inhibiting the work of the lipoprotein lipase enzyme, cholesterol levels will decrease.¹⁴

In addition, the hypocholesterolemic effects of ginger are caused by the inhibition of cellular cholesterol synthesis. This is due to the presence of niacin in ginger which causes increased VLDL clearance, lowers triglyceride levels, increases liver LDL absorption, and inhibits cholesterologenesis.¹⁵

Previous research has shown that ginger has potential as a treatment for several health conditions. Ginger has been researched to address various health problems such as vertigo, motion sickness, cough, menstrual disorders, cancer, heart disease, and also has an effect as an antioxidant.⁵

Other studies conducted concluded that emprit ginger has high effectiveness in preventing and curing various diseases, this is due to the gingerol content in emprit ginger which has very strong anti-inflammatory and antioxidant properties. Gingerol is an active compound that gives

ginger a nutty flavor and has been known to have the potential to counteract inflammation and protect body cells from oxidative damage.⁵

Ginger emprit in particular has benefits in lowering the levels of bad cholesterol (LDL) and triglycerides in the blood. This is especially important because high LDL levels and high triglycerides are major risk factors for heart disease and other cardiovascular health problems. Thus, emprit ginger has the potential as an additional therapy to manage cholesterol levels and maintain heart health.¹⁶

Although these studies provide promising preliminary evidence, keep in mind that ginger should not be considered a single treatment for serious diseases. The use of ginger should be consulted with the relevant medical professional, especially if you are taking other medications or have a certain health condition. In addition, more extensive and in-depth research is needed to ensure the effectiveness and safety of the use of ginger in the treatment of certain diseases.

CONCLUSION

Based on the results of the research conducted, it can be concluded that the administration of emprit ginger extract has the potential to have a significant influence on students who suffer from hypercholesterolemia. In this study, most students (60%) showed a decrease in cholesterol levels towards the "normal" category after consuming emprit ginger extract. These results are supported by

statistical analysis using the Wilcoxon method with a p-value of 0.000 ($p < 0.05$), which shows that there is an effect of giving emprit ginger extract (*Zingiber officinale* Rosc.) on cholesterol reduction in students suffering from hypercholesterolemia.

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