The Effectiveness Of Vernonia Amygdalina (African Bitter Leaf) Tea For Reducing Cholesterol Levels In Individuals With Hypercholesterolemia

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A B S T R A C T

Advances in technology and high activities at work cause a person to prefer fast food, increasing the risks of high cholesterol levels. Meanwhile, the healing of hypercholesterolemia requires a long treatment time. One of them is non-pharmacological treatment using Vernonia amygdalina (African bitter leaf) tea. This study analyzes V.amygdalina (African bitter leaf) effectiveness for reducing the cholesterol levels in individuals with hypercholesterolemia. The design of this study was a quasi-experimental design, with a non-equivalent control group design. The population involved individuals with hypercholesterolemia in the village of Kedensari RW 05 Tanggulangin, Sidoarjo. There were 40 respondents in this study using the purposive sampling technique – 20 respondents in the experimental group and 20 respondents in the control group. The independent variable was V.amygdalina tea, whereas the dependent variable was cholesterol levels. The data were analyzed using the Wilcoxon and Mann-Whitney tests. The p-value of the Wilcoxon test and Mann-Whitney signed-ranks test was $(0.000)<\alpha(0.005)$, which illustrated that V.amygdalina (African bitter leaf) tea was useful for the treatment of hypercholesterolemia.

INTRODUCTION

Technology and lifestyle alter habits in food consumption (Riansari, 2008). Nowadays, people prefer to consume fast food. The risk of fast food consumption contains high cholesterol levels, especially fried foods, due to increased heating (Tri, 2011). Maulida, Mayasari, and Rahmayani (2018) state that the primary cholesterol sources are meat, poultry, fish, and dairy products. Meanwhile, plant-based foods do not contain cholesterol. Serum cholesterol level less than 200 mg/dl is within the normal cholesterol levels. When it is more than 200 mg/dl, it is considered hypercholesterolemia (Waloya, Rimbawan, and Andarwulan, 2013).

Based on a report from the Ministry of Health of the Republic of Indonesia, in the book Profile of Non-Communicable Diseases in 2016, the number of high cholesterol cases based on the case visit to the community health post for non-communicable diseases prevention activities (from now on referred to as *Posbindu-PTM)* and the public health center (from now on referred to as *Puskesmas*) in East Java, Indonesia was shocking. There were 8225 case visits, and around 2967 cases were individuals with high cholesterol, as approximately 36.1%. The case rate of high cholesterol in 2015 was 58.5% and in 2016 was 52.3% – based on the Indonesian percentage of risk factors for non-communicable disease in

Posbindu-PTM and *Puskesmas* between 2015 and 2016. The initial survey from the cadre records in Kedensari Village RW 05 showed that the number of individuals with high cholesterol cases in RT 17 was approximately 23.

Nowadays, the rise of the high cholesterol rate sprang by the diet and the lack of exercise. Rates individuals with High cholesterol or hypercholesterolemia continue to increase (Rahma, Natsir, and Kabo, 2014). When there is inadequate hypercholesterolemia treatment, it can lead to stroke because the blood flow to the brain is blocked. Additionally, it leads to atherosclerosis (Yani, 2015). Atherosclerosis is one of the causes of heart disease. Heart disease is the leading cause of death in the world (Hendra, 2016) (Ninaprilia, Z. and Kurniawaty, 2013). Based on the data obtained from WHO (2011), cardiovascular diseases were among the causes of death (30%). Ardiani (2017) reports that around 80% of deaths due to cardiovascular disease occurred in developing countries.

Hypercholesterolemia treatment takes an extended period. People with high cholesterol must be able to get used to change their diet and lifestyle. Hypercholesterolemic drugs such as HMG CoA inhibitors have side effects, including myoglobinuria, rhabdomyolysis, and myopathy. The continuous use of chemical medications will also harm the body. Recently, people tend to consider herbal medicines more. The treatment used to lower the cholesterol level is *V.amygdalina* (African bitter leaf) (Nuryani, 2018). The study conducted by Ardiani (2017) reported that *V.amygdalina* contained saponins, lactones, flavonoids, tannins, glycoside, and triterpenoids. The results showed that the ethanol extract of African bitter leaf at a dose of 100 mg/kg, 150 mg/kg, and 200 mg/kg of body weight significantly reduced total cholesterol level ($p<0.05$) compared to the negative control. It concluded that giving ethanol extract of African bitter leaf at 100 mg/kg, 150 mg/kg, and 200 mg/kg of body weight could reduce the total cholesterol levels. Based on previous studies, *V.amygdalina* can reduce blood lipids levels, so *V.amygdalina* is possibly a potential product to reduce hypercholesterolemia. Based on the background, the research aims to examine the effectiveness of *V.amygdalina* (African bitter leaf) tea for lowering cholesterol levels in individuals with hypercholesterolemia.

METHOD

The design of this study was a quasi-experimental design, with a non-equivalent control group design. Before the treatment (giving *V.amygdalina* tea), the authors examined cholesterol levels in both the experimental and control groups. *V.amygdalina* (bitter leaf) administration was given to the experimental group with a dose of 2 g/sachet three times a day for 15 days. The control group did not receive *V.amygdalina* tea – The researchers gave health education about cholesterol. We re-examined cholesterol levels again in both groups after treatment.

The study aims to investigate the effectiveness of *V.amygdalina* (African bitter leaves) tea to reduce cholesterol levels in individuals with hypercholesterolemia. The population in this study involved all individuals with hypercholesterolemia in the village of Kedensari RW 05 Sidoarjo. The sampling technique was purposive sampling – a sampling technique in which the researchers determine the sample according to the research objectives. The respondents in this study were 40 individuals with hypercholesterolemia. There were 20 people in the experimental group and 20 people in the control group. The experimental group was treated with *V.amygdalina* tea, while we gave health education about cholesterol in the control group.

The independent variable was *V.amygdalina* tea, whereas the dependent variable was cholesterol levels. The research instrument used an observation sheet and a tool for measuring cholesterol levels. In the experimental group, the researchers came to the respondents' home and gave *V.amygdalina* tea every day within 15 days. The interval between giving treatment and re-checking the cholesterol levels was 15 days. While in the control group, we gave health education about cholesterol at the cadre's house. Measurement of respondents' cholesterol levels was a post-test 15 days later.

Data analysis used univariate and bivariate analysis. The univariate analysis explained age, sex, education, occupation, income, and duration – individuals suffering from hypercholesterolemia. Determine the effectiveness of *V.amygdalina* tea on blood cholesterol levels used bivariate analysis. Moreover, this study used the Wilcoxon and Mann-Whitney tests.

RESULT

a. Univariate Analysis

The respondents' characteristics described age, gender, education, occupation, income, and duration of suffering from hypercholesterolemia in the experimental and control groups.

Table 1. Percent distribution of respondents by age, Sidoarjo 2020

Age	Experimental Group		Control Group	
	Frequency	Percent	Frequency	Percent
26-35	7	35	4	20
36-45	8	40	10	50
46-55	3	15	4	20
>55	2	10	2	10
Total	20	100	20	100

Table 1 describes the average age in the experimental and control group is 36-45 years – 40% in the experimental group and 50% in the control group.

Table 2. Percent distribution of respondents by gender, Sidoarjo 2020

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Gender	Experimental Group		Control Group	
	Frequency	Percent	Frequency	Percent
Male	2	10	4	20
Female	18	90	16	80
Total				

Table 2 explains that the respondents in the experimental group 18 (90%) were mostly female, while 16 respondents (80%) in the control group were female.

Table 3. Percent distribution of respondents by occupation, Sidoarjo 2020

Occupation	Experimental Group		Control Group	
	F	%	F	%
Civil Servants	2	10	0	0
Private Employees	5	25	**3**	15
Entrepreneur	8	40	10	50
Retired	0	0	0	0
Unemployed	5	25	7	35

Table 3 illustrates that most respondents in both groups were entrepreneurs (self-employed) in detail, eight people (40%) in the experimental group and ten people (50%) in the control group.

b. Bivariate Analysis

The bivariate analysis examined the effectiveness of treatment (African bitter leaf tea) in reducing cholesterol levels in respondents. The first analysis was the change of cholesterol levels in the experimental group between pre and post-test. Then the authors evaluated the gap in cholesterol levels in the control group between pre and post-test, followed by examining the difference (Δ) of cholesterol levels between both groups.

Table 4. The Wilcoxon test results on mean scores of cholesterol levels in the experimental and control group before and after the treatment.

Cholesterol Levels		N	Mean	Sum of Rank
Pre and Post Test Experiments	negative rank	20	10,50	210
	Positive Ranks	0	0	0
	Ties	0		
	Total	20		
Pre and Post Control Test	negative rank	20	10.50	210
	Positive Ranks	0	0	0
	Ties	0		
	Total	20		

a. cholesterol levels experiment and control post < pre-experimental cholesterol levels
b. cholesterol levels experiment and post control > pre-experimental cholesterol levels
c. cholesterol level experiment and control post = pre-experimental cholesterol level

The Wilcoxon test result in the post-test experimental group showed lower cholesterol levels than the pre-test (table 4). These results indicated that there were differences in cholesterol levels in the pre-test and post-test. The negative rank or the difference (negative) between the pre-test and post-test cholesterol

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levels were not 0 either on the N value, Mean Rank, or Sum Rank. These results indicated that there was a decrease in the results of the pre-test and post-test scores. While the Ties value was 0, illustrating that the pre-test and post-test scores were not the same

Table 5. The results of Wilcoxon test statistics

Test	Post test -pre test experiment	Post test -pre test control
Z	-6.046	-3.923
Asymp. Sig. (2-tailed)	.000	.000

Table 5 shows a difference in the pre and post values in the experimental and control groups (p<0.05).

Table 6. The Mann-Whitney test results in the experimental and the control group

Test	Experimental Group	Control Group
Mann-Whitney U	26.500	191.000
Wilcoxon W	236.500	401.000
Z	-4.726	-.250
Asymp. Sig. (2-tailed)	.000	.000
Exact Sig. [2*(1-tailed Sig.)]	.000[b]	.000[b]

Table 6 indicates a significant p<0.05, illustrating that giving *V.Amygdalina* tea reduces cholesterol levels in individuals with hypercholesterolemia.

DISCUSSION

Based on the study conducted by Ardiani (2017), African bitter leaf (*V.amygdalina*) contained flavonoids, saponins, and tannins found in EEDA (Tandi, Mariani, and Setiawati, 2020) (Pratiwi and Gunawan, 2018). Flavonoids can reduce cholesterol synthesis because they have the enzyme 3-hydroxy 3-methyl glutaryl (HMG CoA). Flavonoids can lower blood cholesterol levels by reducing cholesterol and bile acids' absorption in the small intestine. Then there is increased excretion of cholesterol through feces. Flavonoids cause liver cells to increase the formation of bile acids from cholesterol, which will reduce fat because it becomes energy (Adi Sucipto, 2008) (Tri, 2011). Tannins that react with mucosal proteins of intestinal epithelial cells can inhibit fat absorption. Saponins work in reducing the absorption of cholesterol in the intestines and reducing the absorption of bile sap. Saponins work by binding bile salts to form non-absorbable compounds. The second way of working is by making bile salts so that they can bind to polysaccharides in dietary fiber, then excreted with feces. Bile salts cannot bind to cholesterol, so the body cannot absorb cholesterol (Hasan, Subroto, and Puspasari, 2018).

African leaf has a bitter taste when consumed. *V.amygdalina* can detoxify the body because of its antioxidant properties (Faradisa, Marfu'ah, and Amal, 2018). There are so many beneficial effects and ingredients of the leaves besides reducing cholesterol levels. During this time, many people assume *V.amygdalina* as insulin leaves. Its use to decrease blood glucose levels. Pharmacological research on the leaf extract of *V.Amygdalina* can control blood glucose levels in diabetic patients. This leaf causes

hypoglycemia and hypolipidemia. Dian (2015) states that *V.amygdalina* is safe for consumption both as medicines and food because of no harmful effects on the liver and kidneys.

Table 2 shows that most of the respondents were female. The research conducted by Hendra (2016) showed that women tend to have higher blood cholesterol levels during childhood than men during childhood. In fact, at the age of 20, men have a higher cholesterol level than women. But when reaching menopause, there is a reduction of estrogen levels in women.

Table 1 shows that the respondents' average age in the experimental group and the control group is between 36 and 45. The research conducted by Hendra (2016) on risk factors for increased cholesterol reported that in individuals over 30 years, age became the significant risk factor for increasing blood cholesterol levels. Listiana and Purbosari (2010), in their research, also said that total cholesterol levels also increased when people got older. The increase in cholesterol level triggers the risk of ischemic stroke. The increasing age will also be at risk for cerebral ischemia, regardless of ethnicity and gender. People aged over 55 years have the risk of developing cerebral ischemia twice as much as the lower age. The development is a transitional period for men and women to leave their physical characteristics and behaviors of adulthood and enter life with new physical characteristics and behaviors. The developmental tasks at this age take the form of further development and maturation in young adulthood. Concerning health, adults begin to accept and adapt to the physical changes that happen in them.

The control group did not receive Vernonia Amygdalina tea but received health education was showed a difference between the pre-test and post-test (Table 4). The respondents' age in the control group is between 36-45 years – classified into adulthood. When people enter emotional maturity and control their emotions, they can think carefully, well, and objectively (Chaplin, 2009). Therefore, they will accept knowledge and information from the surrounding environment easier. Many factors can cause high blood cholesterol levels. In addition to herbal medication, individuals must also control their diet, exercise, and avoid smoking and stress. Thus, they need to look at some of these factors to control cholesterol levels. When the cholesterol levels are well maintained, there is a reduced risk of stroke and heart attack.

CONCLUSION

This study concludes that consuming *V.amygdalina* as tea reduces blood cholesterol levels in individuals with hypercholesterolemia.

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