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EFFECTS OF GOLOBE (Hornstedtia Alliacea) FRUIT EXTRACTS ON THE CHANGES OF TOTAL CHOLESTEROL LEVELS IN PATIENTS WITH HYPERCHOLESTEROLEMIA

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ABSTRACT

Cholesterol is a lipid, amphipathic and an essential structural component of the membrane and the outer layer of plasma lipoproteins. This compound is synthesized in many tissues from Acetyl CoA (Botham and Mayes, 2009). Golobe Halmahera (Hornstedtia alliacea) is a fruit-producing plant that is a member of the ginger family (Zingiberaciaea).

This study aims to determine the effect of Golobe Halmahera (Hornstedtia alliacea) fruit consumption on the decreased levels of total cholesterol in hypercholesterolemia patients in Puskesmas (Public Health Center) Toliwang, West Kao District, North Halmahera Regency in 2016. This research is quasi-experimental design with pretest and posttest control group. With a total sample of 10 respondents, sampling is done by consecutive, non-probability sampling.

Results of statistical test (SPSS) shows significant value = 0.000 < 0.05, or the value of t-value (12.073) > t-table ((2.776)). This shows that Golobe Halmahera fruits have an influence on the decrease of the total cholesterol levels.

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The results show a significant value = 0.000, thus has proven that the experimental group Ho is rejected while the Ha is accepted (where sig. < 0.05). The control group gained sig = 0.374. This proves that the Ho is accepted for its sig. > 0.05.

INTRODUCTION

Cardiovascular disease is the leading cause of death worldwide. Based on the report by the World Health Organization (WHO, 2011), of 57 million deaths world's population, 17.3 million (31%) of deaths is caused by cardiovascular diseases, particularly heart disease (7.3 million) and stroke (6.2 million). One of the major risk factors for cardiovascular disease is high cholesterol. (Bangun, 2003).

Research conducted by the Lipid Research Clinic in the US found the same correlation between total blood cholesterol levels and heart disease risk. This study found that every 1% decrease in total blood cholesterol levels, the risk of heart disease fell by 25% (Fatmah 2010). According to the *Framingham Heart Study*, the risk of heart disease increases when total cholesterol levels are greater than 200 mg/dL, and will increase by three to five times when the levels exceed 300 mg/dL (Durstine, 2012).

Many factors may have influenced the total blood cholesterol levels. One such factor is the consumption of foods containing cholesterol. Cholesterol in the food consumed will increase total cholesterol levels in the blood. If the intake of cholesterol is still balanced with the amount needed, the body will stay healthy. However, many people consume foods that contain excessive amounts of cholesterol, which can cause total cholesterol levels in the blood to exceed the normal limits (Soeharto, 2004). One in five Americans have high total cholesterol levels, but many of them are unaware because the symptoms are usually invisible. Usually, people know that they have high total cholesterol levels after a heart attack or stroke as a result of hypercholesterolemia (Nurrahmani, 2012).

The prevalence of high total cholesterol was highest in the European (54%) and American (48%) regions, while the lowest prevalence was in the African (23%) and Southeast Asia (30%). The prevalence increases as the state revenue increases. In countries with low-income levels, the total cholesterol levels of a quarter of their adult population increases. Meanwhile, in countries with high and middle income, the total cholesterol levels of one-third and more than half (50%) of their adult population increase (WHO, 2011).

Riskesdas report on Biomedical Sector in 2007 showed that the prevalence of dyslipidemia in Indonesia was 39.8% when viewed from total cholesterol of > 200 mg/dL. Some provinces in Indonesia such as Nanggroe Aceh, West Sumatra, Bangka Belitung and Riau Islands possess dyslipidemia prevalence of ≥50% (Perki, 2013).

Based on data from Puskesmas Toliwang, West Kao District, North Halmahera Regency from January to May 2016, as many as 10 patients were detected of hypercholesterolemia. (Monthly report of PHC Toliwang 2016).

Golobe Halmahera *(Hornstedtia alliacea)* is a fruit-producing plant, a member of ginger family *(Zingiberaciaea)*. The fruit is sweet, slightly acidic usually eaten fresh. It grows to about 3.5 m, and form dense clumps. The leaves form a narrow, upside down lancet, around 55-65 x 5 -12 cm, glabrous on both surfaces, and has a tip-like tail.

Flowers in bunches are spindle-shaped, with a length of about 11 cm including the stem. Labellum reached 3 cm long, much longer than the petals, and the middle thicken, while the edges are rounded with a wavy edge. When it bears fruit, then the bunches bulge similar to large onions, with a diameter of 4-5 cm; the berry fruits are covered with multi-layered protective elliptic leaves, about 3 × 2 cm. The seeds are small, about 2 mm, black and shielded with silvery white salute similar to mucus with sweet and sour taste.

Based on the above background, the researchers are interested in conducting research on "The Effect of Golobe Halmahera *(Hornstedtia alliacea)* on the Changes of Cholesterol Levels in Patients with hypercholesterolemia In Puskesmas Toliwang, West Kao District, North Halmahera Regency".

METHOD

This study is Q*uasi-Experiment Design Control Group* with *pretest* and *posttest control group*. Two groups were selected randomly. The first group received the treatment while the second group did not. The first group is called the experimental group and the second group the control group.

One measurement was made at the start of the research *(pre-test)* in both groups. Then, the first group *(experimental group)* received the treatment and the second group *(control group)* did not. After that, another measurement was made at the end of the

research *(post-test)* in both groups. It aims to see the comparison between the experimental group and the control group.

The study design can be described as follows:

Pretest		Postest
O_1	x	O_3
O_2		O_4

Information :

O_1 = Result of the initial measurement (pretest) of cholesterol levels in the experimental group

O_2 = Results of the initial measurement (pretest) of cholesterol levels in the control group

X = Golobe fruit intervention

O_3 = Results of the final measurement (posttest) of cholesterol levels in the experimental group

O_4 = Results of the final measurement (posttest) of cholesterol levels in the control group

SAMPLE

Sample is a part of a number of characteristics possessed by the population used for the study. (Mapanawang, 2016). The number of samples obtained from the population is based on the number of patients who will undergo intervention procedures of Golobe fruit consumption in Puskesmas Toliwang, West Kao District, North Halmahera Regency. The sampling technique used is *non-probability sampling* with a sample size of 10, because the population is less than 30. The sample was then divided into two groups: 5 respondents for the intervention group and 5 respondents for the control group. The samples are selected based on inclusion and exclusion criteria.

RESULTS AND DISCUSSION

Puskesmas Toliwang is located in Toliwang village, West Kao District, North Halmahera Regency. It has 22 working areas, which are included in the West Kao working area. This study was initiated on 3 June, and conducted until 3 July, 2016, through direct interviews using a questionnaire to 10 respondents.

Analyses of the data used in this study were univariate and bivariate using SPSS. The univariate analysis in this study is the characteristics of the respondents such as age, gender, and education. Out of 10, eight respondents (80%) were female, whereas two (30%) were male; five respondents (50%) aged 28-40 years, 4 respondents (40%) aged 41-50 years, and one of the respondents (10%) aged > 50.

The bivariate analysis was conducted with T – Test in SPSS, including Pre-test and post-test in the control group, and the measurements before and after consuming Golobe fruits in the intervention/experiment group.

Table 1. Measurement Results of Total Cholesterol Levels in the Control Group (Pre Test)

No.	Value	Frequency	Percentage
1	*<200*	*3*	*60%*
2	*200-239*	*2*	*40%*
3	*> 240*	*0*	*0%*
Total		*5*	*100*

The above table shows that the measurement results of the total cholesterol levels in the control group *(Pre Test)* are: 3 respondents (60%) were Upper Limit (200-239) and 2 respondents (40%) were High (> 240).

Table 2. Measurement Results of Total Cholesterol Levels in the Control Group (Post Test)

No.	Value	Frequency	Percentage
1	<200	3	60%
2	200-239	2	40%
3	> 240	0	0%
Total		5	100

The table above shows that there is no difference between pre and post tests in the control group, which means that the total cholesterol levels of the hypercholesterolemia patients in the control group did not change. Respondents with Upper-Limit cholesterol levels were three respondents (60%) and with High levels two respondents (40%).

Table 3. Measurement Results of Total Cholesterol Levels in the Experimental Group (Pre Test)

No.	Value	Frequency	Percentage
1	*<200*	*3*	*60%*
2	*200-239*	*2*	*40%*
3	*> 240*	*0*	*0%*
Total		*5*	*100*

The above table shows that the results of the total cholesterol levels in the experimental group (Pre Test) are: 3 respondents (60%) were in Upper Limit (200-239) and 2 (40%) respondents were in High level (> 240).

Table 4. Measurement Results of Total Cholesterol Levels in the Experimental Group (Post Test)

No.	Value	Frequency	Presentation
1	*<200*	*5*	*100%*
2	*200-239*	*0*	*0%*
3	*> 240*	*0*	*0%*
Total		*5*	*100%*

The above table shows that the percentage of the measurement results of the decline in total cholesterol levels after consuming Golobe Halmahera fruits are: five respondents (100%) were in Optimum cholesterol levels, zero respondents (0%) were in Upper-limit and High level. This shows that there is a decrease in total cholesterol levels in patients with hypercholesterolemia after consuming Golobe Halmahera fruits.

T-Tests Analysis of Cholesterol Levels in the Experimental Group (pretest and posttest)

SPSS Statistical test results showed a significant value = 0.000 <0.05, or the T-value (12. 073) > T-table (2.776). It can be concluded that there is an effect of Golobe fruit on the decrease of total cholesterol levels and df = nk (5-1 = 4; two-tailed / 0.025), where n = the number of respondents and k = 1.

T-Tests Analysis of Cholesterol Levels in the Control Group (pretest and posttest)

SPSS Statistical test results showed t-value = -1000 with significant value = 0.208. It can be concluded that there is no effect or a decrease in the total cholesterol levels in the control group. It can be seen from the significant value (0.374> 0.05) and t-value (-1000) < t-table (2.776) and df = n-k (5-1 = 4; two-tailed / 0.025), where n = the number of respondents and k = 1.

DISCUSSION

Decision Making on the Bivariate T-Test in the Experiment Group *(Pre-Test and Post-Test)*

1. Decision-making is based on a comparison of t-value and t-table.
    a. If t-value is greater than t-table, Ho is rejected
    b. If t-value is smaller than t-table, Ho is accepted

2. T-value is 12.073, while the t-table is calculated as follows:
    a. Significance level is 5% for 2-tailed test, hence halved to 2.5%
    b. Df or *degree of freedom* is calculated with a formula of data amount -1 or 5-1 = 4
    c. The test is two-tailed with a value of df = 4 and significance value of 0.05, resulting in the value of t-table of 2.776

It can be seen that t-value for the total cholesterol levels was 12.073 with a probability of 0.000 for two-tailed test, so that the eventual probability figure was 0.000/2 = 0:00, thus Ho was rejected. Meanwhile, t-value for cholesterol level was 0.00 > 0.025, with a probability for two-tailed test, so that the eventual probability figure thus Ha was rejected.

This shows that cholesterol levels before and after eating fruit Golobe Halmahera is relatively different. In other words, Golobe Halmahera fruits are effective in lowering the total cholesterol levels.

Decision Making on the Bivariate T-Test in the Experiment Group *(Pre-Test and Post-Test)*

1. Decision-making is based on a comparison of t-value and t-table.
    a. If t-value is greater than t-table, Ho is rejected
    b. If t-value is smaller than t-table, Ho is accepted

2. T-value is -1000, while the t-table is calculated as follows:
    a. Significance level is 5% for 2-tailed test, hence halved to 2.5%
    b. Df or *degree of freedom* is calculated with a formula of data amount -1 or 5-1 = 4
    c. The test is two-tailed with a value of df = 4 and significance value of 0.05, resulting in the value of t-table of 2.776

Based on the analysis of this research, the consumption of Golobe Halmahera fruits accompanied by lifestyle and diet modification, and avoiding risk factors that can increase cholesterol level, was very influential in lowering the cholesterol level.

CONCLUSION

Research Murti (2009) showed that there are differences in total cholesterol levels with gender. This is consistent with the results of research by Madupa (2006) which stated that there is a significant relationship between the sexes with total cholesterol levels. Women tend to have a higher risk of total cholesterol (> 200 mg/dL) or 2.19 times compared to men.

The decline in some types of hormone causes mass loss while the increased activity of other hormones increases fat mass. It is also due to reduced physical activity with increasing age, which in turn causes decreased Basal Metabolic Score (AMB). (Soetardjo, 2011).

Total cholesterol levels increase with age. In men, the increase stops at around age 45-50 years. In women, the increase continues until the age of 60 to 65 years (Suiraoka, 2012). The statement was supported by research by Madupa (2006), that there was a significant association between age and total cholesterol levels. Likewise, a study by Hatma (2001) on Minangkabau and Sunda ethnic populations found that age is associated positively with total cholesterol levels. Age contributes 5.02% to the variation of total blood cholesterol levels. Another study conducted Le et al (2006) in Thailand also showed association between age and cholesterol levels.

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