The Comparison of effectiveness between carrot *(Daucus Carota)* and Simvastatin to Changes in Blood Cholesterol Levels of white rats *(Rattus Norvegicus)* with Hyperkolesterolemia

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Abstract

High level blood cholesterol can impact on diseases. Carrot known with high beta carotene able to reduce blood cholesterol levels. The aim of the research was to determine the comparison effectiveness between carrots and simvastatin on cholesterol levels in hypercholesterol rats. The type of the research was experiments used randomized control-group pretest - post test design. The samples were divided into simvastatin and carrots treatment groups, each of 8 rats. Hypercholesterolemia by administering high-cholesterol diet. Treatment using raw carrots with 1.25cc dose for 3 days. Measurement of cholesterol levels using Touch Essay data analysis with Willcoxon and Mann-Whitney. The results showed decreased cholesterol simvastatin groups as much as 12.5% ($P = 0.069 > \alpha = 0.05$), and the treatment group as much as 37.5% ($P = 0.208$), but the statistical test showed no effect of carrots on blood cholesterol levels. While the effectiveness of the results between treatment and control group ($P = 0528 > \alpha = 0.05$), indicating no effect to decreased levels of good cholesterol and a control group treated group. No effect on decrease in cholesterol levels could be caused by factors of beta-carotene absorption easier if you boil carrots. Additionally only 3% beta-carotene in raw carrots was released during digestion.

Keywords: *levels-cholesterol, hypercholesterolemia, carrots, beta-carotene*

INTRODUCTION

No contagious diseases become a leading cause of death globally . Data WHO (world health organization) shows that of the 57 million deaths that occurred in the world in 2008, as many as 36 million or nearly two- thirds were caused by no contagious diseases. Several cases of no contagious disease including hypertension, coronary heart disease, diabetes mellitus, stroke, cancer and chronic respiratory diseases (Bulletin of the window and Health Information , 2012). Based on a sample of 1.5 % 300,000 heart diagnosed by a doctor , as much as 0.5 % on the interview with the doctor , 0.3 % had signs and symptoms of heart disease and as many as 0:13 % had heart failure

The coronary heart disease become one of the major cause of death caused by narrowing of the lumen of blood vessels of the heart or often called atherosclerosis (Kabo 2008) The emergence of atherosclerosis triggered by a buildup of cholesterol in the blood (hypercholesterolemia). Cases of atherosclerosis increase if there are factors - risk factors that can be changed include high diit , hypertension, diabetes mellitus, smoking, obesity, and stress (Brunner and Sudart, 2000). In addition, there are other factors that cannot be changed among others ras, sex, ages and genetic (Mutaqqin, 2009). High-fat diet can cause hypercholesterolemia by triggering the accumulation of cholesterol (Muttaqin, 2009). Cholesterol is a nutrient or component of the complex fat needed by the body as one of the highest sources of energy and also is the manufacture of sterol (Nurwahyuni, 2006). Cholesterol is divided into HDL (high destiny lipoprotein) cholesterol is the type that contains a lot of protein and LDL (low destiny lipoprotein) cholesterol is the type with a lot of fat. When excess levels of

LDL will settle on the walls of the arteries that can lead to narrowing until closing. Therefore, an increase in LDL is one of the oxidants in the body (Fikri, 2009). Then attempt to decrease cholesterol levels in the blood is expected to reduce cases of atherosclerosis. Therefore, researchers wanted to use herbs. Herb is a plant or plants that have the purpose or value in the treatment because it contains an active substance that is useful for therapeutics. Advantages of herbal plants which lack side effects, processed naturally without chemicals, easily available and affo (Iklan Pos, 2014). One of plants used is carrots *(Daucus Carota)*

Plant carrots (Daucus Carota) is no stranger to the world community, because always there regardless of the season. The community has many cultivate as plantation that profitable.

Plant carrots (Daucus Carota) is an annual herb, can be consumed as vegetables, juices and even for snacks. Besides the price is relatively affordable, Carrots (Daucus carota) have low side effects (Cahyono, 2006). Based on the results of the study showed that the consumption of raw carrots every morning can lower blood cholesterol up to 11% (Julianti, Nurjanah and Soetrisno, 2009). This is because there is a compound in carrots beta-carotene. Based on research Parwata (2010) serves as an antioxidant beta carotene which has the ability to reduce free radicals, especially singlet O2. Taking beta-carotene derived from carrots are safe and will not give toxic effects to 100,000 IU per day. This is in contrast to the excessive synthetic beta carotene have potential risks as prooxidan (Muchadi, 2009). The walls in carrots also contain pectin, which is a type of dietary fiber, which is water-soluble (Soluble dietary fiber). This type of fiber acts to lower cholesterol levels and blood sugar (Vallerie, 2009).

Higher beta-carotene in carrots is still raw, but the absorption of beta-carotene more easily if the carrots boiled first (Muchadi, 2009). Also based on laboratory test results MOH nutritional composition of ingredients in raw carrots more than in cooking and presentation of other (MOH, 1995). Based on research in carrots (Daucus Carota) contained beta carotene 7.6 mg, alphakarotin 3.4 mg, vitamin E 465 mcg, Vitamin B1 69 mcg, Vitamin B2 53 mcg, nocotamide 500 mcg, acid pentofanat 270 mcg, Vitamin B6 270 mcg, phosphoric acid 26 mcg, 0.7 mg vitamin (Rozaline, 2006). Therefore, the researchers want to do research on the effectiveness of the carrot (Daucus Carota) on cholesterol levels in rats (Rattus norvegicus*)*.Research Question

Are there any potential differences in cholesterol reduction in white rat Rattus norvegicus after carrots compared with simvastatin?

METODS

Independent variable : processing of carrots, carrots dose and duration of administration. Dependent variable : decrease in blood cholesterol levels. The design of this study was true experiment using *pretest posttest control group design*. The sample is based on a formula Federer, the (t-1) (n-1) ≥15, t is the treatment group, n is the number of samples per treatment group. Then the number of samples in each treatment is 8 of rats. Cholesterol levels obtained by measuring the blood of rats before treatment carrots. The provision of a diet high in cholesterol (egg yolk duck, goat oil, lard, flour) in feed. Treatment of carrot (blended), filtered and then administered by sonde. Measurement of blood cholesterol levels by taking from the tail end. Analysis of the data used was Kruskal Wallis statistics to examine differences in the speed of cholesterol reduction using 95% confidence level used by SPSS 17.

RESULTS AND ANALYSIS

This study aims to determine the differences decrease blood cholesterol levels by using the carrot (Daucus carota) were given to rats (Rattus norvegicus) after administration of a diet high in cholesterol. During the study, there was no samples droup-out, complications or serious side effects.

Distribution Of Rats Weight On Pre And Post Treatment.

Table 1. Distribution of rats weight on pre and post treatment.

No	Weight (gr)	Pre		Post	
		∑	%	∑	%
1	100-150	1	6.25	9	56.25
2	160– 200	12	75	2	12.25
3	210– 250	3	18.25	5	31.25

Based on table 1, before treatment 75% weigh 160-200 grams. While the percentage of weight loss with 6:25 smallest 16% of rats. Body weight of rats after treatment given change of weight range 100-150 gr changed from 6:25% increase to 56.25%. weight gain also occurred in the range of 210-250 g of 18:25% increase to 31.25%. However, for the range of 100-150 g decreased from 75% to 12.5%.

The Distribution Of Cholesterol Levels Of Rats On Pre And Post Treatment

Table 2 The distribution of cholesterol levels of rats on pre and post treatment

No	Sample	Daucus (mg/dl)		Simvastatin (mg/dl)	
		Pre	Post	Pre	Post
1	1	100	154	141	162
2	2	207	167	138	150
3	3	132	165	112	218
4	4	171	168	100	150
5	5	147	137	164	117
6	6	150	168	131	145
7	7	159	174	179	209
8	8	100	349	153	207
Median		145.75	185.25	139.75	169.75

Based on the table 2 cholesterol treatment group had the highest cholesterol levels 207 mg / dl and the lowest cholesterol level is 100 mg / dl. Value - average cholesterol levels of white rats in the treatment group before being given a raw carrot was 145.75 mg / dl. While the control groups were not given the treatment had the highest cholesterol levels 179 mg / dl and the lowest cholesterol level is 112 mg / dl. Value - average cholesterol levels of white rats control group was 139.75 mg / dl. After tabulation of data obtained average - average cholesterol levels of white rats treated group before being given a raw carrot is greater than in the control group were also not given the treatment by a margin of 6 mg / dl.

Table 2 also shows the results of research in the form of cholesterol after treatment in the treatment group and the control group. From these results indicate that high cholesterol levels in the treatment group was 349 mg / dl. While the lowest was 137 mg/ dl. Value - average cholesterol treatment group mice who had been given a raw carrot was 185.25 mg /dl. In the control group the highest cholesterol level is 218 mg / dl and the lowest cholesterol levels of 117 mg / dl. Value - average cholesterol levels after the control group given cholesterol drug was 169.75 mg / dl. After calculating the average obtained - average cholesterol levels of white rats after the treatment group was given raw carrots is greater than the cholesterol levels of mice white given cholesterol drug therapy with a difference of 15.5 mg/dl. From the comparison of the difference between the average - average results from before and after treatment showed that an increase in average differences - cholesterol rats from the difference between the previous average of 6 mg/dl to 15.5 mg / dl. Of the difference could be concluded that a change in cholesterol levels between before and after treatment.

The Distribution Of Cholesterol Levels Of Rats On Pre And Post Simvastatin Treatment

Table 3 The distribution of cholesterol levels of rats on pre and post simvastatin treatment

No	Sample	Simvastatin	
		Pre (mg/dl)	Post (mg/dl)
1	1	141	162
2	2	138	150
3	3	112	218
4	4	100	150
5	5	164	117
6	6	131	145
7	7	179	209
8	8	153	207

Median	139.75	169.75
Average range	30	
A P : 0.069		

Based on Table 3 the results before and after drug administration cholesterol in the control group obtained average - average before being given treatment was 139.75 mg / dl and the average - average after being given treatment with the drug was 169.75 mg / dl. Based on the above tabulated results are an increase in the average - average cholesterol levels before and after treatment of cholesterol drug delivery. While based on the data of the table is a decrease in cholesterol levels before and after treatment as much as 12.5% of all samples. Changes in cholesterol levels before treatment was 164 mg / dl after being given the drug treatment of cholesterol dropped to 117 mg / dl. But based on statistical result obtained P = 0.69 in other words P> α = 0.05 which means acceptable and there is no effect of cholesterol drugs against cholesterol test animals white mice.

The Distribution Of Cholesterol Levels Of Rats On Pre And Post Daucus Carota Treatment

Table 4 The distribution of cholesterol levels of rats on pre and post Daucus carota treatment

No	Sample	Daucus Carota	
		Pre (mg/dl)	Post (mg/dl)
1	1	100	154
2	2	207	167
3	3	132	165
4	4	171	168
5	5	147	137
6	6	150	168
7	7	159	174
8	8	100	349
Rata rata		145.75	185.25
Average range		39.5	
α	P : 0.208		

Based on Table 4 in the treatment group obtained average - average before being given a raw carrot was 145.75 mg / dl and the average - average after given raw carrots increased to 185.25 mg / dl. Based on these results it can be concluded there is an increase in the average - average cholesterol levels before being given a raw carrots and after given raw carrots. However, based on the table there is also a decrease in cholesterol levels 37.5% of the total number of samples treatment groups. Among rats No. 2 with cholesterol levels of 207 mg / dl to 167 mg / dl, the mice no 4 with cholesterol 171 mg / dl changed to 168 mg / dl and no rat 5147 mg / dl changed to 137 mg/dl. Different things also occur in mice No. 8 is characterized by an increase drastic of cholesterol before treatment of 100 mg / dl increased to 349 mg / dl. But based on statistical results available P = 0.208, in other words P> α = 0:05 so that it can be concluded that there was no effect on cholesterol levels of raw carrots test animals white mice.

Cholesterol Mice After Treatment In The Treatment Group And The Control Group

Table 5 Cholesterol mice after treatment in the treatment group and the control group

No	Sample	Post control (mg/dl)	Post treatment (mg/dl)
1	1	162	154
2	2	150	167
3	3	218	165
4	4	150	168
5	5	117	137
6	6	145	168
7	7	209	174
8	8	207	349
α	P : 0.528		

Based on the table 5 after the test statistics on the results of the effectiveness of the provision of raw carrots and giving cholesterol drugs obtained P for 0528. because the value P> of the α = 0.05, then the hypothesis is rejected, which means there is no influence. it can be said that there is no effect of raw carrot to decrease cholesterol levels either the control group or the treatment group.

DISCUSSION

Carrots are one of the root vegetables that are rich in bioactive compounds. Carrots has become a major vegetable and is commonly known as and carotene content (Sharma, et al, 2012). Carotene as an antioxidant dampen singlet oxygen and prevent lipid peroxidation, the effect resembles the effects of vitamin E and vitamin C in protecting DNA and membranes from oxidative attack endogenous (Robbins, et al., 2004; General, 2013).Carotene acts as an antioxidant to prevent a chain reaction generated hydroxyl radicals thus preventing disconnection chain fatty acids in membranes and prevents the formation of disulfide bonds (-SS) the protein so it does not lose its biological activity for the formation of energy (Mayes, 2002). Carotenoids are lipophilic so that play a role in cell membranes to prevent lipid peroxidation. β carotene is a compound that can give electrons (electron donor) to free radicals or oxidants so that a stable radical compounds (Meyes, 2002; General, 2013). β carotene is known as an excellent antioxidant, due to its ability to quench singlet oxygen and peroxyl radical scavenger (Agung, 2013). he results showed no difference in each treatment to reject the hypothesis. Probably due to the levels of β carotene contained in carrots is still very low. This is in line with research Heber and Lu (2000), which shows that at the same concentration of various carotenoid compounds, β carotene will have lower antioxidant activity. The addition of carotenoid intake can increase the concentration of lipoprotein carotenoids

In addition there is also a pectin carotene in carrots. Pectin is able to decrease absorbance bile acid but only slightly lowering cholesterol (Leveille, 1966) pectin binding bile acids and increased spending that is then wasted with feces. Bile acid binding by pectin causes bile acids out of the enterohepatic cycle. Decrease the amount of bile acids cause liver uses cholesterol in the blood as a precursor of bile acids. Increased faecal bile acid or cholesterol is lost can result in decreased plasma cholesterol and increase the turnover of cholesterol biosynthesis in animals (Linder, 1992). Will tetepi on the results of this study showed no pectin high cholesterol absorption capability. Pectin levels in carrots is very small, about 7.4%

There is no difference in treatment can be influenced metabolism in rats of different bodies. When the number of calories derived from food is less than energy expended the endogenous savings will be issued (Ganong, 2002). Food absorption there may be differences in each individual and therefore contributes to increased levels of cholesterol (Haryanti, 1997). The conditions allowing the mice to spur the production of stress hormones epinephrine, norepineprin, corticotropin and glucocorticoids that activates hormone-sensitive lipase that breaks down triglycerides, triglycerides and free fatty acids increase. The stress hormone causes the active genes in fat cells that can multiply and thrive.

Comparative Analysis Of Cholesterol In Pre And Post Control Group

Based on the results of data processing showed that there were decreases in cholesterol levels before and after treatment as much as 12.5% of the test animals, but based on statistical result obtained P = 0.69 in other words P> α = 0.05 which means acceptable and there is no effect of cholesterol drugs against cholesterol test animals white mice. It is possible researchers used the lowest dose in the study. The dose used was 0144 mg. based on research results Venesa et al (2013) volume required is 10 mg simvastatin medications for cholesterol-lowering effect in rats. In line with the research Unneyputty (2013) the dose of simvastatin to rats of 0.18 mg / day / 200 gr BB. Another possibility rat cholesterol level changes caused by the activity of the rats based on the observations of researchers, rats experienced enough activity. Because of the activity on a regular basis can improve HDL cholesterol and pressing total cholesterol and LDL cholesterol and triglycerides burn to lose weight. In addition to food activity also

affects changes in cholesterol levels. foods that contain a lot of cholesterol, trans fats and high in saturated fat such as cheese, lard, beef brain and viscera increase cholesterol levels in the blood. Stress experienced by the rats within lasts long enough will destroy the balance of body functions so that it can raise cholesterol and blood pressure (Wijayakusuma. 2008).

Comparative Analysis Cholesterol Levels Of Mice In The Treatment Group Before And After Given Raw Carrots

Based on the results of data processing are cholesterol-lowering amount of 37.5% of the treated group of mice. But based on statistical results obtained P = 0.208, in other words P> α = 0:05 so that it can be concluded that there was no effect on cholesterol levels of raw carrots test animals white mice. There may be because of the absorption of white mice terhadapa raw carrots. This is in line with research Muctadi (2009) argued that a higher content of beta carotene in carrots is still raw, but the absorption of carotenoids easier if carrots boiled first. Raw carrots have tough cell wall makes the body can only convert less than 25% beta-carotene into vitamin A. Based Rukmanan (2006) Carrots can be eaten in various ways, but only 3% of beta carotene in raw carrots is released during the digestion process takes place, this can be increased to 39% through cooking and add palm oil.

Comparative Analysis Cholesterol Levels Of Mice In The Treatment Group And The Control Group

Based on the results of a statistical test the effectiveness of the provision of raw carrots and giving cholesterol drugs obtained P for 0528. The P value> of the α = 0.05, then the hypothesis is rejected, which means there is no effect, it can be explained that there was no effect of cholesterol-lowering both the control group and the treatment group. This is caused due to the timing of therapy is only 3 days. According to research conducted Vanese et al (2013) cholesterol changes which occurred in the first week can also be caused due to environmental stress, and changes in the type and pattern of food suddenly. As soon as rodents can adapt to food, metabolism lasted well so that cholesterol in the blood can go down by itself

CONCLUSION

The results of this study had demonstrated that there were no effect of Daucus carota on high levels cholesterol white rats (Rattus norvegicus)

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The sample size is the least. Time research to short treatment so alteration not maximal

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