TheEffecntof Giving Furfures Soybean Tempeh NuggetTowardReducing Cholesterol Levelof White RatBlood(RattusNorvegicus) Hypercholesterolemia

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Abstract. Coronary heart disease becomes a major cause of death because of the increase of cholesterol level in blood. *Tempe* and *bekatul*are said to be able to reduce blood fat levels. **Problem**: Howis the effect of Furfures Soybean *Tempe* Nugget oncholesterol levels of white rat*Rattusnurvegicus*hypercholesterolemiablood.**Objective:** To demonstrate the effect of Furfures Soybean Nugget on cholesterol levels of white rats *Rattusnurvegicus* hypercholesterolemia blood. **Method:** using laboratory experimental design with Randomizet Pre and Post Contro -group Only in hypercholesterolemia mice. The micewere given nugget 25%, 50%, 75% and Controlled for 21 days. The statistical analysis in this study was different test of Anova (analysis of varian) and continued with *Benferoni* test. The result shows that there is a significant gap of decreasing cholesterol level between controlled group with treatment 1, 2, 3 but it was not significant between the treatment 1,2 and 3. It can be concluded that giving Furfures Soybean Nugget can reduce cholesterol level in blood when it compared with not given treatment. Reducing cholesterol level with 1, 2, 3 treatments are not different significantly.

INTRODUCTION

There is a change of disease pattern in Indonesia, usually infection and malnutrition, which becomes degenerative and cancer disease now caused the change of life style and dietary habit which tends to consume highly fat and low fiber food. According to (SKRT) Household Health Survey Result in 1992, 1995 and 2001, it stated that heart attack and blood vessel are mostly the primary cause of death (31% of the whole death case) caused because of atercolosis in coroner blood vessel. Furthermore, Household Health Survey Result in 2001 stated that there is health problems in Indonesia, (except Nangroe Aceh Darussalam, Maluku, and Papua) for ages around 35-65 years old according to the cholesterol-total >200 mg/dl. The limit of blood cholesterol level needing treatment is cholesterol > 260 mg/dl, trigliserida >200 mg/dl and also LDL > 190 mg/dl with the main pillar of dislipimedia management through out diet modification, physical excercises, and weight management..

Tempeh is a fermentation food of soybean which is fermanted by Rhizopus oligosporus fungus. Tempeh can reduce trigliserida, total cholesterol, LDL cholesterol and also it can increase HDL cholesterol. The substances of tempeh have hypocholesterolemic (reducing blood cholesterol) which is protein, PUFA, food fiber, niacin, E vitamin, carotenoids, isovlafones, and calcium. The result of research shows that by giving 150gr tempeh for 2 weeks without using medicine can reduce total cholesterol 8,38%, LDL 8,28% (11,1 mg/dl), trigliserida 9,19% and increase HDL around 8.74%. another research has a result that using of 25%,50% and 70% tempeh in ration as the real subtitution can reduce serum cholesterol total. Genistein is the isovlafones existed in tempeh which believably can stop enzymes causing the development and movement of cell, so genistein can prevent the development of cell which creates plaques in artery vessel.

Besides tempeh, bran is also reported by some researches as a food that can reduce blood cholesterol level. Bran is the residue of rice milling. The result of bran oil and cholesterol metabolism in rat body shows that hypercholesterol rat fed bran oil and oil of sunflower seed with (7:3 wt/wt) proportion can decrease heart and serum cholesterol level. The hypocholesterolemic effect can be caused by oryzanol and tocotrienol existing in the oil. The result of a research reported about the reduce of cholesterol level in hamster body fed unfat bran woof and there are some levels in bran oil and the more significant reduce of cholesterol is the bran woof with fat content 43,7% compared to hamster fed with cellulose. The fat acid content of bran can reduce the cholesterol level in hamster, rat, primate and human body. Bran also contains of ferulat which can reduce blood pressure and blood cholesterol,

besides tocotrienol and gamma-oryzanol. The mechanism of blood fat reduce is assumed through the increasing of receptor LDL bound capacity. Another mechanism which has a role in blood cholesterol reduce is the increasing of cholesterol-7 alpha-hydroxylase enzym activity that is responsible enzym toward the process of bile acid biosynthesis, so it will stimulate the convertion of cholesterol to be bile acid and that is why it will cause the reduce of cholesterol in blood. Fiber has an influence toward the reduce of blood cholesterol because it will bind bile acid and release it along with feces. Much more fiber we eat, much more bile acid is released from our body along with feces. It will trigger the cholesterol changing to be bile acid, so cholesterol level will reduce. Result research shows that by consuming 85 gr of bran a day, it can reduce cholesterol around 8,3% and increase HDl cholesterol level (good cholesterol) around 11,8%.

Nugget is a rare product frozen to keep its quality during the strorage process. Combined nugget from optimum bran and tempeh powder (Furfures soybean tempeh) with powder comparison 60 : 40 is one of the solution to reduce cholesterol level in hypercholesterol rat body.

RESEARCH METHOD

The type of this research is experimental laboric research with randomizedpre-post test and control group (Randomized prepost- test with control-group).

20 male rats or rattus nurvegicus which are 15 weeks old with criterion 180 – 220 gr weight , healthy and agile are used in this research. After it get adapted with the environtment of the cage during 2 weeks, the rats are grouped into 4 treatment groups and every group consists of 5 rats. The first treatment is done by chechking the early cholesterol and it is continued by feeding high cholesterol which refers to Hardiningsih (2005) with ingridients of 100 gr woof contained 1,5 cholesterol from yolk, 10% fat goat, and palm oil 1%. It will be given by using sonde instrument during 1 weeks and after that the rats will be checked the blood cholesterol level. Then, the rats are given a treatment by feeding AIN-93 rodential standart woof and Furfures Soybean Tempeh Nugget during 28 days using sonde instrument. The need of rats is 10% of the whole rat weight, so if a rat has a weight 200gr, the need woof for the rat is only 20gr. Group I as he control group is feeded only by standart woof. The I treatment group is fed standart woof and furfures soybean tempeh nugget 25%. The seond treatment group is fed standart woof and furfures soybean tempeh nugget 50%. The third treatment group is fed standart ransum and furfures soybean tempeh naugget 75%. In the end of day 14th, 20th, and 28th, the rats are checked by taking their blood to see the cholesterol level.

The cholesterol level check uses CHOD-PAP method. The data tabulation and analysis uses Anova different test continued Benferoni test with significance degree limit $p < 0,005$ and 80% research power and 95% interval belief.

RESULT OF THE RESEARCH

The result of this research shows that the high cholesterol woof and PTU (propil tiu urasil) gives an effect toward the increasing of cholesterol level of blood cholesterol of wistar galur white rat Rattus Nurvegicus, and overall, group treatment 1,2 and 3 after being treated shows the reduce of vholesterol level. to see the blood cholesterol level of the rats during this research as below :

Rata-rata Kadar Kolesterol Tikus (mg/dl)
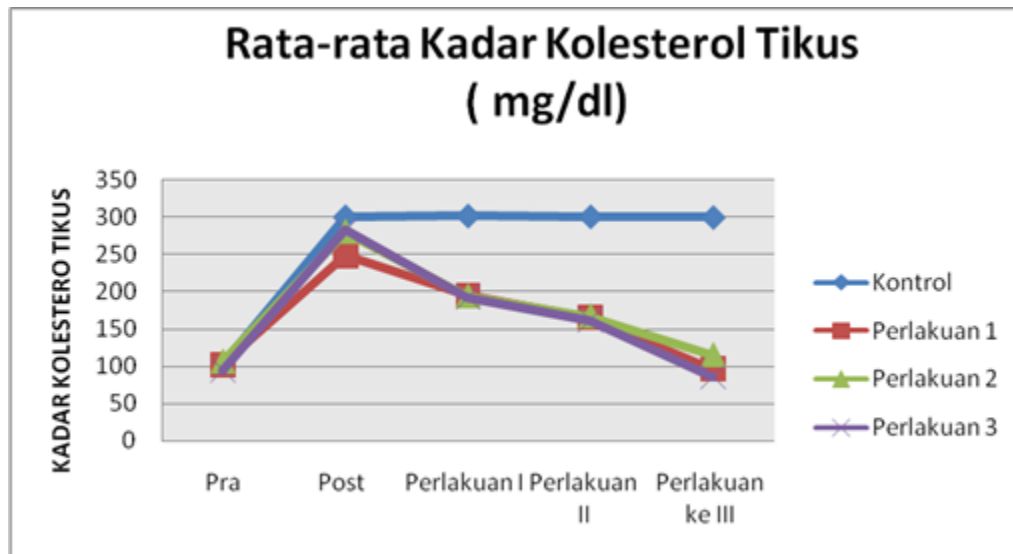
(a)

To compare the difference of the blood cholesterol level reduce between one group to others is done by using post hoc test. The result of post hoc test on every week can be seen in table 1.

Table 1. P score is the result of post hoc test about the mean comparison of blood cholesterol level reduce between control group and treatment group after the 1st week, 2nd week and 3rd week.

Treatment	Treatment	1st week		2nd week		3rd week	
		Different mean	P	Different mean	p	Different mean	P
TreatmentIII	Control	83,66	0,000	57,83	0,000	31,83	0,000
	Treatment1	-10,00	0,052	29,50	0,000	37,83	0,000
	TreatmentII	-13,16	0,040	11,66	0,003	25,50	0,000
TreatmentII	Control	96,83	0,000	46,16	0,000	6,33	0,189
	Treatment1	3,16	0,084	17,83	0,000	12,33	0,015
	TreatmentIII	13,16	0,045	-11,66	0,003	-25,50	0,000
TreatmentI	Control	93,66	0,000	28,33	0,000	-6,00	0,213
	Treatment1I	-3,16	0,084	-17,83	0,000	-12,33	-0,015
	TreatmentIIII	10,00	0,052	-29,50	0,000	-37,83	0,000
Control	TreatmentI	93,66	0,000	-28,33	0,000	6,00	0,213
	Treatment1I	96,83	0,000	-46,16	0,000	-6,33	0,189
	TreatmentIIII	83,66	0,000	-57,83	0,000	-31,83	0,000

According to the table above, it can be seen that the reduce of blood cholesterol between the control group and treatment group 1, control group and treatment group 2, and control group and treatment group 3 is significantly different, but the reduce of blood cholesterol level between group treatment 1, 2 and 3 is not significantly different.

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It also happens in group treatment 2 and 3 which does not show the significant difference in the reduce of blood cholesterol level.

DISCUSSION

The result of this research shows that there is a cholesterol level reduce in the group which is fed with different dose of furfures soybean tempeh nugget compared to control group. It is totally appropriate with Hasan's research (2007) that by feeding 150gr tempeh during 2 weeks without consuming medicine can reduce total cholesterol around 83,8%. Furthermore, according to Sutapa's research (2006) shows that by using tempeh as the subtitution in ransum around 50% and 70% actually can reduce serum cholesterol total and according to Tri Rosari's research (2004), feeding tempeh around 13,5gr/kg bb for one rat a day and 20,25gr/kg bb a day during 14 days can significantly reduce blood cholesterol level of the rats. Accordance with Pawiroharsono (2001), the components of tempeh which is assumed hypocholesterolemic are protein, fat acid without double unsaturated, fiber, niacin, E vitamin, isoflavones, and calcium. Isoflavones can reduce cholesterol toward the increasing of fat cell metabolism to create energy which causes the reduce of cholesterol content. Fermentation process using lactic acid bactery in tempeh also can increase isoflavones activity in soybean. Isoflavones contained in yellow soybean is the sterol which is originally from plant (Fitosterol) which if it is consumed, it can stop cholesterol absorption, whether cholesterol coming from diet or cholesterol produced from liver.

This detention happens due to the fitosterol competing and replacing the cholesterol position in mice cell. Because of the mechanism, it causes the cholesterol absorbed by gut reducing, so it will get reduced. Another factor of tempeh which has a role in reducing serum cholesterol is metabolit substance resulted from the fermentation of lactat acid bactery such as Conjugated Lonoleic Acid (CLA) and also some acids. Conjugated Linoleic Acid (CLA) is grouped as the weak acid without double saturated fat which can be used for the diet suplement that has the ability to reduce organic acid serum cholesterol level resulted from lactat acid bactery fermentation. The substances that have a role toward the reduce of serum cholesterol level are propionate acid and orotat acid. Propionate acid and orotat acid will compete with reductase HMG-KoA acid, so there will be retardment cholesterol synthesis that influences toward the cholesterol level synthesized by liver. Tempeh and bran also contain fiber which totally can be the retardment for the absoprtion, so there will be a reduce of food delivering in kilo micro form which directly causes toward the reduce of cholesterol level inside liver. Food fiber in tempeh and bran also can increase the hydroxylase -7a-cholesterol enzym activity which can contribute toward the reduce of cholesterol inside liver. The reduce of cholesterol in liver can direct to the reductase (HMG-COA) metilglutarilkoenzym-3-hydroxy-3 enzymatic activity to increase the synthesis of endogenous cholesterol.

The bile acid excretion escalation by feces will cause the amoung of bile acid inside enterohepatic reducing. Liver will produce bile acid by taking much more cholesterol inside blood, so cholesterol concentration inside blood will reduce. According to Wilson et.al (2007), hypocholesterolemic effect exists in bran and other factions (Neutral Detergent fiber, hemiselulosa, and other unsoaped material) in research whether animal or human. Bran oil can actually reduce the blood cholesterol level. The unrelated component in bran is horyzanol, campesterol fitosterol substances and B-sitosterol. Oryzanol component, campesterol fitosterol substances and B-sitosterol can be antioxidant and competitive inhibitor in asbsorption and synthesis cholesterol. The real mechanism is the cholesterol absorption in gut, whether cholesterol coming from food or endogenous cholesterol. Oryzanol will create a complex substances with unabsorpted cholesterol, so the absorption level of the cholesterol will reduce in bile acid absorption. The over cholesterol will be released along with feces. Tocoferol will press the lipid peroxidation through the peroxil radical capture, including the peroxidation way or the reaction with lipid peroxy radical way. *A-tocoferol is the* strong breaker antioxidant of free radical chain and the most potential E vitamin Isomer absurpted in fat. Tocotrionel also can stop the choletserol synthesis, reducing the serum choletserol level in many researches toward animal and also pressing the proliferation of tumor cell.

CONCLUSION

The giving of furfures soybean nugget can reduce the blood cholesterol level compared to control group and the reduce of cholesterol level between group 1, 2, and 3 is not significantly different.

ACKNOWLEDGEMENT

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