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Effectiveness of Giving Functional Food of Combination of Rice Bran and Soybean on Blood Cholesterol Levels Dislipidemic Sufferers in Aceh Besar District, Indonesia

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Absract:- Increased cholesterol levels, especially LDL or blood triglycerides need attention because it is a predisposition to coronary heart disease. The high incidence of dyslipidemia in Banda Aceh and Aceh Besar requires attention so as not to cause other complications. Dyslipidemia can be prevented, among others, by improving nutrition by consuming functional food combinations of rice bran and soybeans that contain bioactive substances such as inositol, gamy oryzanol and isoflavones that function to destroy fat and reduce cholesterol levels in the blood. This study aims to determine the efficacy of functional food combination of rice bran and soybeans on blood cholesterol levels in patients with dyslipidemia at the Darul Imarah Health Center in Aceh Besar District. This functional food is expected to be used as an alternative to reduce blood cholesterol levels of dyslipidemia sufferers. This research is a quasy experiment with a Randomized Controlled Trial (RCT) design with two treatment groups. The study was conducted from July to September 2018. Data collected were characteristics of the sample of research subjects, risk factors for dyslipidemia and blood cholesterol levels. Stages of research are: making functional food combination of bran and soybeans, the efficacy of functional food products on blood cholesterol levels of dyslipidemia patients. Provision of intervention in the treatment group for 2 weeks. Data analysis used statistical tests of dependent and independent t-tests with a degree of confidence of 95% (α <0.05). Provision of 50 grams per day of functional food can reduce blood cholesterol levels by 21.80 mg/dl, while patients with dyslipidemia who are given 100 grams of these functional foods reduce blood cholesterol levels by 30.10 mg/dl. Functional food combination of rice bran and soybeans can be used as an alternative to reduce blood cholesterol levels in patients with dyslipidemia.

Keywords:- *Functional food combination of rice bran and soybeans, blood cholesterol levels, dyslipidemia sufferers.*

I. INTRODUCTION

Dyslipidemia is a lipid metabolism disorder characterized by an increase or decrease in plasma lipid fractions. The main abnormalities of lipid fraction are an increase in total cholesterol, low density lipoproptein (LDL) cholesterol, triglycerides (TG) and decreased levels of high density lipoprotein (HDL) cholesterol. Increased cholesterol levels, especially LDL or blood triglycerides need attention because it is a predisposition to atherosclerosis or coronary heart disease[1]. The results of Basic Health Research (RISKESDAS)[2] in Indonesia in 2013 stated that the age range ≥ 15 years had total cholesterol levels above normal values of 35.9%, HDL levels below normal 22.9%, LDL levels above normal values with categories near optimal and borderline 60.3%, high and very high categories 15.9% and triglyceride levels high borderline categories 13.0% for the high and very high categories.

Dyslipidemia sufferers in Banda Aceh and Aceh Besar have shown significant improvement. This increase in number is caused more by sedentary lifestyle changes and wrong eating patterns. The eating habits of the people of Aceh are often consuming foods that are high in fat, lack of dietary fiber and high consumption of coffee triggering the incidence of hypertension. Besides that, the incidence of obesity also shows a fairly high number.

Risk factors for dyslipidemia include high-fat food consumption, smoking habits, hypertension, being overweight, increasing levels of LDL cholesterol, and decreasing HDL cholesterol levels in adults 35 years and over[3]. Dyslipidemia can be prevented, among others, by improving nutrition, maintaining a healthy diet by reducing cholesterol-containing foods and increasing vegetables and fruit. Dyslipidemia can be treated by taking drugs, both synthetic and natural or traditional, which are still being investigated for their effectiveness, side effects and toxicity. Preventive way is to choose foods that can reduce cholesterol levels, for example, are foods that contain isoflavones[4].

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Isoflavones are one type of flavonoids that are proven to regulate lipogenesis in the liver. Genistein and deidzein isoflavones are found in legumes such as green beans and soybeans. Genistein can inhibit the production of hydrogen peroxide and increase the activity of antioxidant enzymes, such as catalase, peroxide dismutase, glutathione peroxidase, and glutathione reductase. Low density lipoprotein that interacts with isoflavones will reduce lipoprotein oxidation and suppress the formation of lipid peroxide and thiobarbituric acid reactive substances. The mechanism of decreasing cholesterol levels by isoflavones by increasing the catabolism of fat cells in the formation of energy resulting in a decrease in total cholesterol levels[4,5,6]. Research conducted by Yousef et al. (2004)[7] shown that intake of isoflavones as much as 2.5 or 5 mg / kg BW in male rabbits can decrease total cholesterol levels by 19.7% and 20.4%.

Isoflavones in soybeans have been shown to reduce triglycerides and improve blood lipid profile[8,9]. Based on research in Semarang, states that soy extract can reduce LDL cholesterol in white mice that have hypercholesterolemia (Hapsari et al., 2009)[10]. A meta-analysis of clinical trials in humans concluded that consuming soy as much as 102 mg / day can reduce LDL levels by 4.98% and significantly increase HDL levels by 3 %[11].

Other ingredients that have other active ingredients are bran. Rice bran is rich in vitamins and other nutrients. Rice bran contains amino acids lysine which is higher than rice. Rice bran protein is of lower nutritional value than eggs or animal protein, but higher than soybeans, corn and flour. Rice bran is also rich in vitamin B complex (B1, B2, B3, B5, B6 and tocopherol) and high fiber. Besides rice bran also contains Pangamanic Acid which is often referred to as vitamin B15. Pangamanic Acid functions in lowering cholesterol, increasing heart strength, and as an antioxidant. Rice bran contains a fairly high carbohydrate, which is 51-55 g / 100 g. The carbohydrate content is part of the rice endosperm because the epidermis is very thin and blends with the endosperm. The presence of these carbohydrates is very beneficial because it makes rice bran can be used as an alternative energy source[12].

II. MATERIALS AND METHODS

This research is a quasy experimental study with a RCT (Randomized Control Trial) design, using a treatment and control group conducted at the Darul Imarah Health Center in Aceh Besar. Determination of the treatment group and the control group was carried out in a double blind manner from the research subjects and examiners of blood cholesterol levels. Data collection and analysis will be conducted from June to September 2018.

The population in this study were all dyslipidemic patients in Darul Imarah District, Aceh Besar District with a total of 150 research subjects. The study used 3 groups, namely 1 control group and 2 treatment groups. The initial stage of the research was the manufacture of functional food products in combination of bran and soybeans. This functional food is made from 50 grams of bran flour and 50 grams of soy flour. This functional food formula is preferred by research subjects because it has a neutral taste and aroma. Functional food combinations of rice bran and soybeans are made based on the stage of manufacture so that functional foods are ready for use in this study.

The data collected was weight, height to determine obesity status with a Body Mass Index (BMI) index, intake of food sources of cholesterol, genetic factors, physical activity and blood cholesterol levels. Data on intake of food sources of cholesterol were obtained from interviews conducted with research subjects. Food recording was carried out before the intervention 2 times and during the intervention 3 times using 24-hour recall, then analyzed using the nutrisurvey program. The foods recorded are mainly food ingredients or food as a source of cholesterol. The physical activity of research subjects was assessed by the Physical Activity Level (PAL) method.

The technical research conducted is as follows: Conducting blood cholesterol levels in the three groups before being given a functional food product combination of bran with soybeans using Easy Touch. Next is the provision of functional food products in combination with rice bran in both treatment groups. In the treatment group I the provision of functional food products with rice bran combined with soybeans for 14 days as much as 100 grams were given 2 times a day in the morning and evening, each time as much as 50 grams. In the treatment group I products were given as much as 50 grams for one giving in the morning for 14 days. Whereas the control group was only given mineral water with the same time giving. Furthermore, examining the blood cholesterol levels of the study subjects in all three groups after the intervention was completed.

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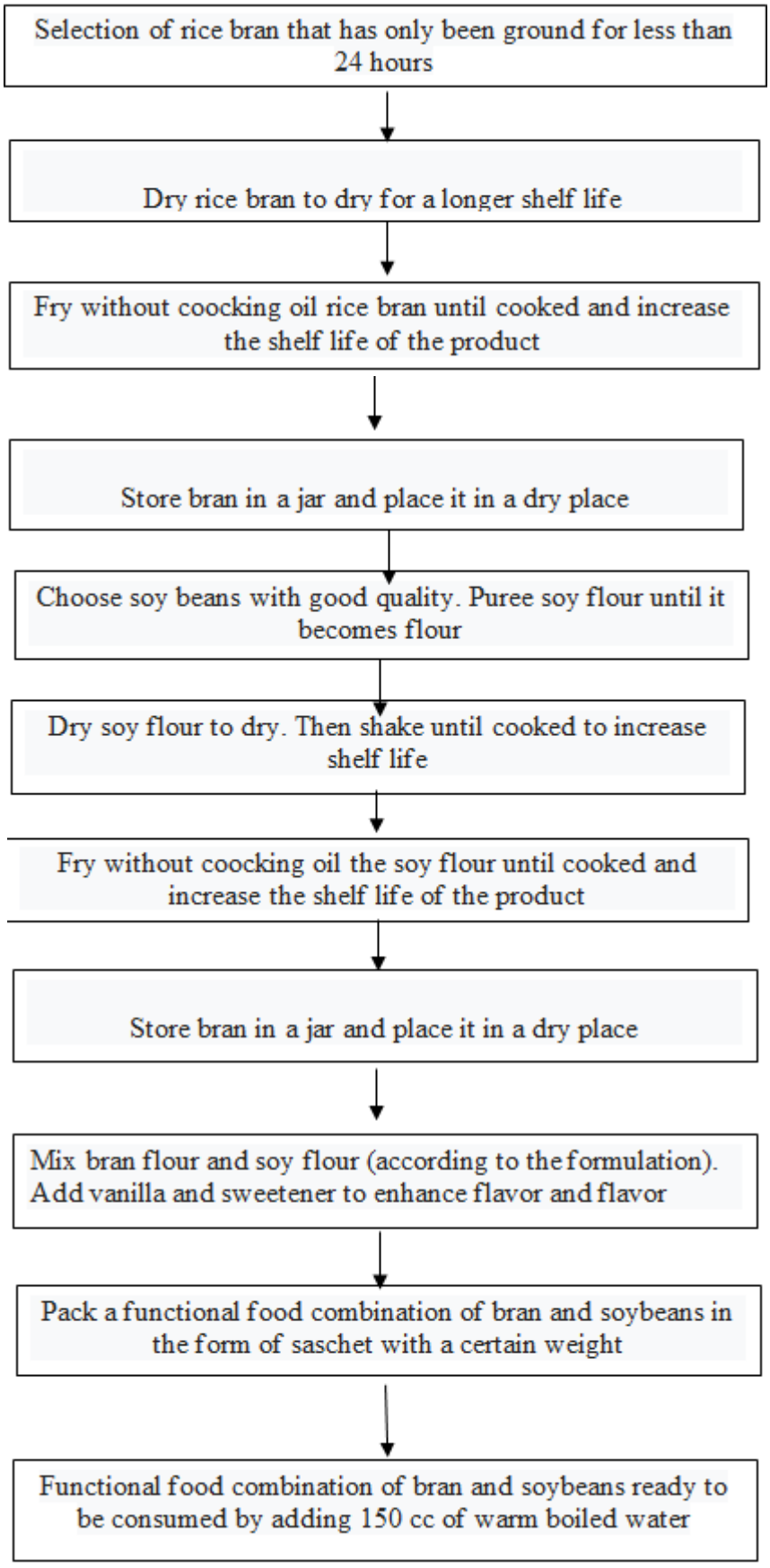

Fig1:- Flow Chart of Making Functional Food Combination of Rice bran with Soybeans

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III. STATISTICAL ANALYSIS

Data were analyzed using Statistical Package for Social Sciences (20.0). Data were analyzed descriptively using frequency distribution. Bivariate analysis was performed using independent and dependent T-test statistical tests at a confidence level of 95% ($\alpha < 0.05$).

IV. RESULTS

Characteristics of Research Subjets	Group					
	Treatment I		Treatment II		Control	
	n	%	n	%	n	%
Age (in years)						
- 35 - 45	15	30,0	15	30,0	18	35,0
- 46 - 55	27	55.0	25	50,0	27	55,0
- 55 - 65	8	15,0	10	20,0	5	10.0
Gender						
- Male	18	36,0	20	40,0	20	40,0
- Female	32	64,0	30	60,0	30	60,0
Pendidikan						
- Secondary School	15	30,0	15	30,0	15	30,0
- High School	20	40,0	20	40,0	18	36,0
- Bachelor	15	30,0	15	30,0	17	34,0
Total	50	100	50	100	50	100

Table 1:- Characteristics of Research Subjets

Based on the age of the study subjects in the three groups, most of them included old adulthood, that is, ages between 50-59 years with the same proportion between the control group and treatment group II by 55% and treatment group I by 50%. Old age is one risk factor for dyslipidemia, with increasing age of adults, decreased physical activity, lean body mass decreases, and fat tissue increases.

Based on sex, the three research groups were dominated by women. In the control group there were women by 65% and in the treatment groups I and II respectively by 50%. Women who have gone through menopause decline in the hormone estrogen which can increase blood cholesterol levels so that they are more at risk of heart disease. Based on the level of education, in the three research groups most of the subjects were high school / equivalent. While Basic and Higher education has almost the same proportion. The low level of education of this research subject will correlate to the difficulty of understanding and implementing the dietary recommendations given by dieticians through nutrition counseling.

Risk Factor of Dyslipidemia	Group					
	Treatment I		Treatment II		Control	
	n	%	n	%	n	%
Genetic						
- Yes	20	40,0	23	46,0	28	56,0
- No	30	60,0	27	54,0	22	44,0
Obesity Status						
- Obesity	38	76,0	25	50,0	38	75,0
- Non Obesity	12	24,0	25	50,0	12	25,0
Asupan Kolesterol						
- Excessive.	20	40,0	23	46,0	25	50,0
- Enough	30	60,0	27	54,0	25	50,0
Aktifitas						
- Less	21	42,0	31	62,0	26	52,0
- Enough	29	58,0	19	38,0	24	48,0
Jumlah	50	100	50	100	50	100

Table 2:- Risk Factor of Dyslipidemia In Research Subjects

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Based on genetic factors, most of the treatment groups I and II did not have hereditary factors for the occurrence of dyslipidemia. Whereas the control group mostly had heredity. Obesity status can also affect the incidence of dyslipidemia. An increase in cholesterol levels in the blood is usually in line with weight gain. The results showed that the majority of dyslipidemic patients in the three study groups were overweight (BMI > 25 kg/m2) or obese.

Cholesterol intake of most research subjects was sufficient (less than 300 mg per day). Cholesterol levels are influenced by the amount and type of fat consumed. However, cholesterol can actually be synthesized in the body even though the amount of cholesterol consumed is small. Saturated fat intake can increase LDL levels which ultimately affect the body's fat profile. The eating habits of large Acehnese people are like consuming fatty foods, foods that are processed using oil or fat by frying or sautéing. Almost every day food processed this way is served to families.

Based on physical activity, most of the research subjects did daily physical activities that were lacking, including rarely doing regular exercise. The low activity of research subjects had an impact on the incidence of obesity and dyslipidemia. The lower the physical activity carried out every day, the lower the daily energy expenditure resulting in an increase in body weight and body fat.

Groups of Research	Blood Cholesterol Levels Before Providing Functional Food (mg/dl)			Blood Cholesterol Levels After Providing Functional Food (mg/dl)		
	Mean	Minimal	Maksimal	Mean	Minimal	Maksimal
Control	243,75	202	283	243,45	197	290
Treatment I	253,20	209	351	223,10	181	288
Treatment II	273,35	215	391	252,55	210	365

Table 3:- Blood Cholesterol Levels Patients with Dyslipidemia Before and After Providing Functional Food Combination of Rice bran and Soybeans

Blood cholesterol levels of dyslipidemia sufferers in the three study groups before given a functional combination of rice bran and soy flour powder varied and in the high category. Before giving functional food, the average blood cholesterol level in the control group was 243.75 mg/dl, in the treatment group I was 253.20 mg/dl and in the treatment group II was 273.35 mg/dl.

Furthermore, blood cholesterol levels of dyslipidemia sufferers after the provision of functional food bran and soybeans for 14 days. After 14 days of rice bran and soybean functional food, there was a decrease in blood cholesterol levels in the study subjects in the treatment group I (an average of 223.10 mg/dl) and in the treatment group II (an average of 252.55 mg/dl). While the blood cholesterol levels of dyslipidemia patients in the control group did not show changes (an average of 243.45 mg/dl).

Blood Cholesterol Levels of Research Subjects	**Mean**	**SD**	**SE**	**p**	**n**
Treatment Group I Early Blood Cholesterol Levels (mg/dl) Final Blood Cholesterol Levels (mg/dl	30.10	11.855	2.685	0.000	50
Treatment Group II Early Blood Cholesterol Levels (mg/dl) Final Blood Cholesterol Levels (mg/dl)	21.80	24.926	5.574	0.000	50
Group Without Treatment Early Blood Cholesterol Levels (mg/dl) Final Blood Cholesterol Levels (mg/dl	0.300	7.212	1.613	0.000	50

Table 4:- Blood Cholesterol Levels Patients with Dyslipidemia Before and After Providing Functional Food Combination of Rice bran and Soybeans

In the first treatment group, 100 grams of functional food were given. It appears that there was a decrease in blood cholesterol levels in the study subjects with an average of 30.10 mg / dl and a standard deviation of 11,855 mg / dl. Statistical test results obtained p <0.005 (p = 0.000) which means that there is a significant difference between the blood cholesterol levels of dyslipidemic patients before and after the feeding formula of rice bran and soybean combination formula. Whereas in the treatment group II functional food was given as much as 50 grams. It was seen that there was a decrease in blood cholesterol levels in the study subjects with an average of 21.80 mg / dl and a standard deviation of 24.926 mg / dl. Statistical test results obtained p <0.005 (p = 0.000) which means that there is a significant difference between the blood cholesterol levels of dyslipidemic patients before and after feeding the combination formula of rice bran and soybeans.

Furthermore, the control group subjects who were given a placebo in the form of water did not change blood cholesterol levels, with an average of 0.300 mg / dl and a standard deviation of 7.212 mg / dl. This decrease in blood cholesterol levels was very slight although statistically obtained p <0.005 (p = 0.000) which means that there is a significant difference.

Blood Cholesterol Levels or Research Subjects	Mean	SD	SE	p	n
Before Treatment					
Treatment Group I (mg/dl)	253,20	35,459	7.929	0,092	50
Treatment Group II (mg/dl)	274,35	41,720	9.329		
After Treatment					
Treatment Group I (mg/dl)	223,10	31,955	7,145	0,016	50
TreatmenGroup t II (mg/dl)	252,55	33,136	7,409		

Table 5:- Effect of Functional Food Giving Combination of Rice bran and Soybeans on Blood Cholesterol Levels of Patients with Dyslipidemia

The average blood cholesterol level of dyslipidemic patients before giving food with formula combination of bran and soybeans in the treatment group I was 253.20 mg / dl with a standard deviation of 35.459 mg / dl. Whereas in the treatment group II the blood cholesterol level of dyslipidemic patients was 273.35 mg / dl with a standard deviation of 41,720 mg / dl. Statistical test results obtained p> 0.005 (p = 0.092) which means that at a 5% confidence level there was no significant effect on the average blood cholesterol level of dyslipidemia sufferers before being given a combination formula of rice bran and soybeans.

Furthermore, the average weight of blood cholesterol levels of dyslipidemic patients after being given a combination formula of rice bran and soybeans in treatment group I was 223.10 mg / dl with a standard deviation of 7.145 mg / dl. Whereas in the treatment group II, the average blood cholesterol level of dyslipidemic patients after being given a formula food combination of bran and soybeans was 252.55 mg / dl with a standard deviation of 33.136 / dl mg. Statistical test results obtained p> 0.005 (p = 0.016) which means that at a 5% confidence level there is a significant influence on the average blood cholesterol level of dyslipidemic patients after being given a combination formula of rice bran and soybeans when compared in the two treatment groups.

V. DISCUSSION

Dyslipidemia is a condition of lipid metabolism characterized by an increase or decrease in plasma lipid fractions. These abnormalities in lipid metabolism are mainly in the form of increases in total cholesterol, low density lipoproptein (LDL) cholesterol, triglycerides (TG) and decreased levels of high density lipoprotein (HDL) cholesterol[13].

The results showed that increased blood cholesterol levels tended to be more experienced by older people than at younger ages. This condition is generally caused by decreased physiological function of the body where the older a person is, the LDL receptor activity decreases. These receptor cells function as hemostatis regulating the circulation of cholesterol in the blood. If these receptor cells are disrupted, their blood cholesterol levels will increase.

This study is in accordance with research conducted by Listiana and Purbosari (2006)[14] shown that there is a relationship between increasing age, so blood cholesterol levels are also increasing. This increase in cholesterol levels causes changes in blood vessels such as contraction and hardening which will eventually increase the risk for various blood vessel diseases.

This research also shows that this high blood cholesterol level affects more women than men. Basically, blood cholesterol levels can increase in men and women with age. In women who have not yet menopause usually have lower cholesterol levels compared to men. This is due to the protective factor of the hormone estrogen. Conversely, women who have menopause have higher cholesterol levels because of the reduced activity of the estrogen hormone.

Cholesterol is mainly obtained from foods, especially foods that contain fat. The eating habits of Acehnese who like processed foods using fat and fried foods are one of the causes of high cholesterol in the blood. Foods that are fried using oil that has been used repeatedly will turn into trans fatty acid which are harmful to health. Snack food that is preferred by Acehnese from all age groups and social economy groups is usually fried foods such as fried bananas, *risol*, *bakwan*, tofu and fried tempeh which are very easy to obtain at low prices and are widely sold along the roadside. This type of snack food has a delicious and tasty taste. In addition, Acehnese also like local cuisine made from beef or mutton, especially fatty meat and offal called *Kuah Beulangong*. This menu is usually presented at weddings, commemoration of the Great Prophet Muhammad's Birthday and at other traditional events. This food is also available everyday and is easily available to the public in traditional and modern stalls/cafés. This type of eating habits is one of the causes of the high incidence of dyslipidemia and hypertension in the people of Aceh Besar and Other Aceh Province regions.

This research is supported by research conducted by Sartika (2011) in West Java, Indonesia showing that the food preferred by the people of West Java from all social groups is food in the form of fried foods that are easily obtained along the road or in public places such as terminals, traditional markets and in shops because the price is cheap and tasty. These snacks like fried foods such as bakwan, fried banana, fried cassava, fried sweet potato, fried tofu, fried mendoan tempeh[15].

Dyslipidemia or abnormal blood fat levels such as high cholesterol levels in the blood, is a major risk factor for cardiovascular disease. Coronary heart disease (CHD) is a major disease caused by high cholesterol. Bad cholesterol (Low Density Lipoprotein or LDL) will accumulate in the walls of arteries, causing plaque called atherosclerosis. This plaque causes the arteries to become narrow, so that blood flow slows down and decreases blood intake and nutrition to the heart, which results in symptoms of chest pain (angina). If cholesterol levels are not lowered, plaque can accumulate more and more until finally it completely blocks the heart's blood vessels, and causes heart attacks[16].

To prevent the effects of high blood cholesterol levels is to use drugs and natural ingredients that are widely available in nature. One ingredient for lowering blood cholesterol is a functional food from plant foods. The functional food provided is a combination of bran and functional food in the form of flour added with sweetener and vanilla as flavoring givers. Based on the results of the study it can be explained that the average blood cholesterol level of the research subjects was above 200 mg/dl. This figure shows high blood cholesterol levels. In the research subject group I treatment that was given a functional combination of rice bran and soybeans for 14 days by 100 grams, showing the results of a decrease in blood cholesterol levels by 30.10 mg/dl. Whereas in the research subjects in the treatment group II who were given a functional combination of rice bran and soybeans for 14 days by 50 grams, there was a decrease in blood cholesterol levels by 21, 80 mg/dl. The decrease in blood cholesterol levels also shows that the provision of functional food combination of bran and soybeans is effective for reducing blood cholesterol levels.

One component of this functional food is rice bran. Rice bran contains many nutritional components when it has been processed into fine rice bran powder and is processed hygienically. Rice bran has contents such as carbohydrates, proteins, minerals, fats, vitamin B complex (B1, B2, B3, B5, B6 and B15). The content of vitamin B15 or Pangamanic Acid functions in lowering cholesterol, increasing heart strength, and as an antioxidant against the possibility of free radicals that are harmful to the body. In addition there are inositol to destroy fat and reduce cholesterol levels in the blood. The content of Gama Orizanol serves to reduce cholesterol levels, prevent arteriosclerosis, and inhibit the process of premature aging which is to prevent premature menopause in women. Phytosterols function to reduce blood cholesterol levels and improve regulation of blood cholesterol at normal levels by reducing lipids (fats) that circulate in the bloodstream. The content of Tokotrienol in rice bran functions as an antioxidant to fight free radicals that enter the body. Other nutrients contained are amino acids, unsaturated fatty acids, and fiber[17].

The high fiber content in rice bran reaches 20-30% of the total weight, and the rice bran content is higher than the fiber found in oats. The high content of food fiber can reduce blood cholesterol levels and Low Density Lipoprotein (LDL) plasma in hypercholesterolemic mice[19]. In addition to dietary fiber, Gamma Oryzanol components have hypocholesterolemic effects. Minatel, et al's research suggests that this Gamma Oryzanol component has the effect of reducing obesity and dyslipidemic conditions in rats fed with high fat and high fructose rations through normalization of triglycerides, LDL, serum total cholesterol, and increasing High Density Lipoprotein (HDL)[20].

Hermawati, et al (2013) research shows that supplementation of bran in the diet is proven to reduce body weight, total cholesterol concentration in serum and liver, and increase HDL levels in the blood without changing the blood glucose concentration of mice[21]. Kania research (2014) concluded that rice bran flour has the effect of inhibiting the increase in blood cholesterol levels in male white rats Wistar strain. Rice bran solution which gives the

maximum inhibitory effect on increasing blood cholesterol levels is a dose of 0.54 gram/200 gram Body weight[22].

Hypocholesterolemic effects of rice bran occur through a decrease in liver cholesterol synthesis characterized by decreased activity of Acetyl-Co A acetyltransferase 2 (ACAT 2), 3 Hydroxy-3 metyl-glutaryl-coenzym A reductase (HMG-C0 A) and Sterol-regulatory element-binding protein 2 (SREBP 2) by increasing liver cholesterol degradation through human cholesterol 7α hydroxylase and human cholesterol 12α hydroxylase in mice fed a hypercholesterolemia diet[23].

Another component of functional food in this study is soybeans. Soybeans are known to be a plant food that has high nutritional value and contains bioactive substances which are potential for health. This potential bioactive substance is isoflavone content with high concentrations up to 1 g/kg[24]. The main types of isoflavones are daidzein and genistein which function as antioxidants, which are associated with decreased blood cholesterol levels and symptoms of menopause[25,26].

Wagustina, et.al research (2006), shows that housewives who have the habit of consuming soy and having sufficient processing results (50 g/day) can slow down menopause. Soybeans and processed products are the main source of phytoestrogens found in nature. By consuming soybeans and the results of adequate processing on a regular basis every day has fulfilled the needs of isoflavones for the body. In addition, the fiber content in soybeans can meet the daily fiber adequacy of the housewife[18].

The USDA (2002) states that in soy flour there are 177.89 mg of total isoflavones per 100 gr of material while daidzein is 71.19 mg / 100 gr of material and ganestein is 96.83 mg/100 gr of material[27]. Based on the statement, the combination of rice and soybean functional food contains a total isoflavone content of 44.48 mg, a daidzen content of 17.80 mg and a ganestein content of 24.21 mg. The high levels of isoflavones derived from soy flour enable this functional food to reduce blood cholesterol levels. Based on the results of the study, the functional combination of rice bran and soybeans given to patients with dyslipidemia as much as 50 grams to 100 grams per day with isoflavone content as above can reduce blood cholesterol levels. Decrease in blood cholesterol levels is not only done by isoflavones in soybeans but also some active substances found in rice bran. Interaction of several active substances found in functional foods further increases the ability to reduce blood cholesterol levels.

Some studies report that by giving 25 grams of protein in food containing isoflavone levels of 37-42 mg isoflavones can improve lipid profile by increasing HDL cholesterol levels and reducing LDL cholesterol levels in the blood [28,29]. Research Safitri, et al (2017) states that the higher the consumption of soy protein (> 25 grams) and fiber consumption, the lower the total blood cholesterol levels[30]. Regular consumption of 1-2 servings of soy protein daily (15-30 g) has a beneficial effect on serum cholesterol levels to prevent coronary heart disease (CHD)[31]. Consumption of soy protein has no hypocholesterolemic effect in adult individuals with normal or low blood cholesterol levels. Thus there is no need to worry that soy will cause very low cholesterol levels[27]. The recommended consumption of isoflavones is 30-100 mg per day[32]. This amount of isoflavones can be obtained from the consumption of approximately 3 medium-sized tempeh pieces every day.

VI. CONCLUSION

Formula food with a combination of rice bran and soybeans that are well received by panelists is Formula A with the composition of bran: soy flour (50:50). Provision of 50 grams per day of functional food can reduce blood cholesterol levels by 21.80 mg/dl, while patients with dyslipidemia who are given 100 grams of these functional foods reduce blood cholesterol levels by 30.10 mg/dl.

RECOMMENDATION

Functional food combination of bran and soybeans is a potential product and can be used as an alternative to reduce blood cholesterol levels of dyslipidemia sufferers. Socialization needs to be done so that people with dyslipidemia can take advantage of a functional combination of rice bran and soybeans to reduce blood cholesterol levels.

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