Contents lists available at IOCS

Science Midwifery

journal homepage: www.midwifery.iocspublisher.org

Effectiveness Purple Sweet Potato Capsules on the HDL of the ASN in Sorong City Government with Central Obesity

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ARTICLE INFO

Article history:

Received Oct 22, 2022
Revised Nov 04, 2022
Accepted Dec 05, 2022

Keywords:

Purple Sweet Potato
HDL
Central Obesity
Local Food
Sorong City

ABSTRACT

Central obesity fat distribution is influenced by sex hormones and occurs mostly in men and has a strong relationship and is a better indicator of changes in HDL. This study aims to assess the effect of giving purple sweet potato capsules to HDL levels in central obesity of ASN in Sorong City Government. This type of research is a quasi-experimental design with a pre-post control group design. The research sample was male civil servants at the Sorong City Government, taken by purposive sampling method with a sample size of 34 people who were divided into 2 groups. The treatment group was given purple sweet potato capsules with a capsule weight of 250 mg/capsule which was consumed 4 capsules/day for 45 days (6 weeks), while the control group was given capsules containing roasted wheat flour. HDL levels were measured before and after the intervention. Food intake of both groups was obtained by semi-quantitative food frequency and food recall methods. Statistical analysis used was paired t test, independent t test, and ANOVA test. In the treatment group there was an increase in HDL levels of 4.12 mg/dl (10.9%) and statistically showed there was a difference before and after the intervention p = 0.00. To the government to encourage people to pay more attention to their health status and pay more attention to the availability of local food that is beneficial to the health status of the community.

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INTRODUCTION

Sweet potato is a well-known plant in Indonesia. Sweet potato ranks seventh in the classification of the most important agricultural products in the world. Based on the color of the tuber flesh, sweet potatoes are classified into white, red, orange, and purple sweet potatoes based on the chemical structure of the different chloroplast pigments. In terms of attractive color, stable after heating and ultraviolet irradiation, and high antioxidant activity, purple sweet potato has the potential as a functional food (Anabire, E.A., 2021).

The changing trend of today's lifestyle that leans towards the west, full of high mobility, and a sedentary lifestyle, affects the incidence of diseases related to lifestyle. This lifestyle, in terms of diet, encourages people to consume fast food which is high in calories and cholesterol. This is what causes the formation of various diseases, one of which is hypercholesterolemia or high cholesterol levels and low HDL levels in the blood (Pomeroy, E., et al., 2019)

Based on statistical data from the Canadian Community Health Survey, the prevalence of obesity in men who work as managerial workers (white collar) in 2002 was around 16.0% (Priyantono, 2013). Research conducted by the Ministry of Health of the Republic of Indonesia in the 2007 National Report on Basic Health Research which states that the prevalence of central obesity is highest in the 45-54 year age group of 26.1% and followed by the 35-44 year age group at 24.1% (Riskesdas , 2007). The increase in the prevalence of central obesity increased in 2013 (Riskesdas, 2013) with a prevalence of 26.4%.

Consumption of food sources rich in saturated fatty acids has an effect on increasing cholesterol and Low Density Lipoprotein (LDL) levels and decreasing High Density Lipoprotein (HDL) levels which can increase the risk of atherosclerosis and other dangerous diseases, such as metabolic syndrome and coronary heart disease. So that increased cholesterol levels have a positive correlation with the formation of atherosclerosis which triggers CHD (Silva Figueiredo, P., et al., 2017)

Hypercholesterolemia or high cholesterol levels and low HDL is a problem in society. Therefore, serious treatment is needed to overcome this problem. Although it is known that there are hypolipidemic drugs and the presence of endogenous antioxidants, the problem of hypercholesterolemia and its relation to cardiovascular disease is still a problem for experts today (Baum, S.J., et al., 2017)

Lipid profile is influenced by several factors such as high cholesterol intake, low fiber intake, obesity, exercise habits, smoking habits, men, postmenopausal women, and the presence of comorbidities such as diabetes mellitus (Enkhmaa, B., et al., 2018). High fat intake increases LDL levels by suppressing the regulation of LDL receptors in the liver. Fiber can lower cholesterol by helping to increase the excretion of bile acids through feces and indirectly binding fat from food (Islam, M. S., et al., 2022).

So far, no research has been conducted to determine the effect of purple sweet potato on HDL levels in humans, given that consumers' preferences for fatty foods in Indonesia are high and their lifestyle tends to be unhealthy while there are concerns about the metabolic effects of low HDL. Based on the above background, researchers are interested in examining the effect of purple sweet potato on HDL levels in central obesity.

RESEARCH METHOD

This research was carried out in several places, namely the Animal Food Chemistry Laboratory, Faculty of Animal Husbandry, Hasanuddin University Makassar for analysis of anthocyanin levels, the Food Technology Laboratory of the Health Polytechnic of the Ministry of Health of Sorong for the manufacture of purple sweet potato capsules, and the Chandra Medika Sorong Laboratory for analysis of HDL levels, as well as the offices and homes of government civil servants. Sorong City for intervention.

The type of research used in this study is a quasi-experimental design with a non-randomized pre-test post-test with control group. This study used 2 intervention study groups, namely group I (given purple sweet potato capsules) and group II (without giving purple sweet potato capsules).

The population of this research is the male civil servants of the Sorong City Government. The research sample was male civil servants of the Sorong City Government who met the inclusion and exclusion criteria.

Data analysis using SPSS For windows program. Test the normality of the data using the Saphiro Wilks test. The normality test which shows the distribution of normal data is then continued by using a parametric test, namely the paired T test to analyze the difference in HDL between before

❒ ISSN 2086-7689 (Print) | 2721-9453 (Online)

and after the intervention. Meanwhile, to analyze the difference in HDL between the intervention group and the control group using the Independent T Test with each value of the degree of significance p≤0.05 at the 95% confidence interval.

RESULTS AND DISCUSSIONS

The results of the analysis describe the distribution of subjects based on characteristics (age, weight, and waist circumference). For the characteristics (Table 1), the weight in the control group has a mean value of 75.19 ± 10.51 and the weight in the intervention group has a mean value of 77 ± 12.39. In addition, age data showed that the control group had a mean value of 43.31 ± 9.6 and age in the intervention group had a mean value of 48 ± 10.39. Then for data on abdominal circumference, it was indicated by a mean value of 96.51 ± 3.61 in the control group and a mean value of 99.42 ± 7.28 in the intervention group.

Table 1. Characteristics of Research Subjects

Subject Characteristics	Control Group (n = 17) Mean ± SD	Intervention Group (n = 17) Mean ± SD	p value
Weight	75.19 ± 10.51	77 ± 12.39	0.65
Age	43.31 ± 9.6	48 ± 10.39	0.19
Belly Circumference	96.51 ± 3.61	99.42 ± 7.28	0.15

Based on Table 2, the results showed that changes in HDL levels in the intervention group increased from 38.29 mg/dl to 42.41 mg/dl (p = 0.000). In addition, the difference in HDL levels between before and after the intervention was 4.12 (10.9%). Meanwhile, the control group showed that the average change in HDL levels decreased from 44.93 mg/dl to 42.18 mg/dl (p = 0.009) and the difference in HDL levels was -2.75 (6.12%) which showed there was a difference. but with a minus value difference. The results of statistical tests showed that there was a difference between before and after the intervention because the p value <0.05.

Table 2. Changes in Mean HDL Levels Before and After Intervention

Group	HDL Pre mean±SD (mg/dl)	HDL Post mean±SD (mg/dl)	HDL Δ mean (%)	p value
Intervention	38.29 ± 7.7	42.41 ± 6.6	4.12 (10.9%)	0.000 *
Control	44.93 ± 7.54	42.18 ± 7.25	-2.75 (6.12%)	0.009*

This study shows that the average body weight of the subjects with a mean value of 75.19 ± 10.51 and 77 ± 12.39 in each group. Likewise with the average abdominal circumference of the subjects with a mean value of 96.51 ± 3.61 and 99.42 ± 7.28 in each group. According to research by Pulit, S.L, et al., 2017 which says that fat in men is mostly accumulated in the subcutaneous abdomen and in the form of intra-abdominal fat. Storage in the abdominal area is more than the hips and thighs so that this fat distribution is called the central fat distribution or android type. This type of fat distribution is influenced by sex hormones so that there are differences in regional fat distribution in men and women.

According to Gadekar, T., et al., 2020, The distribution of fat centered in the abdomen makes it easy to estimate the fat in the body in men so that the measurement of abdominal circumference can

be an indicator of body fat. Abdominal circumference measurements can also predict serum lipid levels better than BMI (Cibičková, L, et al., 2019).

In this study, it was shown that after the intervention using purple sweet potato capsules as much as 1000 mg/day for 45 days (6 weeks), the mean change in HDL levels in the intervention group increased from 44.93 mg/dl to 42.41 mg/dl and statistically significant ($p < 0.05$) which means there is a difference between before and after the intervention. In addition, the difference in HDL levels between before and after the intervention was 4.12 (10.9%).

This is in line with research conducted by Jawi et al., 2011, which showed that water extract of purple sweet potato tubers given to rabbits for three months showed a significant increase in HDL and a decrease in LDL ($P<0.05$). Besides Jawi, 2011, other studies show the same thing as in the research of Setyaningsih et al., 2013. This study was also strengthened by research conducted by Wardhani, 2012, which showed that administration of purple sweet potato at a dose of 2.0 ml/200g BW could reduce LDL levels by 61.07% in rats, but the test dose had no effect on HDL levels.

Purple sweet potato contains anthocyanins which are phenolic compounds that give red, blue, and purple pigments to plants and are water soluble. Anthocyanin in purple sweet potato, 3-caffeoyl sophoroside-5-glucoside, which is present in all parts of sweet potato (Torres, A., et al., 2021).

Anthocyanins have several biological properties, namely as antioxidants and anticancer and have the right anti-inflammatory binding. Previous studies have shown that anthocyanins (C3G) are absorbed into the blood in intact form and metabolized to methoxy derivatives in the liver and kidneys. Anthocyanins then activate AMPK (Adenosine Monophosphate-Activated Protein Kinase) which induced significant phosphorylation of ACC (Anti-Acetyl-coA Carboxylase) and regulated PPARα (Peroxisome Proliferator-Activated Receptor) and ACO (Acetyl-coA Carboxylase) in the liver thereby increasing the decrease in blood levels. fat through increased fatty acid oxidation (López-Pedrouso, et al., 2020).

In a study conducted by Qin, 2009, it was shown that consumption of anthocyanins increased HDL-cholesterol concentrations (13.7% in the anthocyanin group and 2.8% in the placebo group, respectively; $P<0.001$) and decreased LDL-cholesterol concentrations. cholesterol (13.6% in the anthocyanin group and 20.6% in the placebo group, respectively; $P<0.001$). The reduction in cellular cholesterol for serum increased more in the anthocyanin group than in the placebo group (20.0% and 0.2%, respectively; $P<0.001$). This study showed that pure anthocyanin supplementation had a beneficial effect in lowering LDL concentrations and increasing HDL concentrations. This indicates that pure anthocyanins derived from fruit may result in a greater reduction in CVD risk factors. It has been reported that the incidence rate of cardiovascular disease decreases by almost 1% for every 1% decrease in LDL and for every 1% increase in HDL (Krga, I., et al., 2019).

Foods with high crude fiber content are also reported to reduce body weight. Dietary fiber will stay in the digestive tract in a relatively short time so that the absorption of nutrients is reduced. In addition, foods that contain relatively high fiber will provide a feeling of fullness because the composition of complex carbohydrates is to stop appetite, resulting in a decrease in food consumption. Foods with relatively high crude fiber content usually contain low calories, low sugar and fat content which can help lose weight, reduce the occurrence of obesity and heart disease (Grundy, M. M. L., et al., 2016).

The decrease in HDL levels was most likely due to the administration of purple sweet potato capsules given for 45 days (6 weeks) in a row. Purple sweet potato which contains anthocyanins can improve lipid profile because anthocyanins Anthocyanin, a type of flavonoid found in purple sweet potato tubers, can inhibit the absorption of cholesterol in the gastrointestinal tract or can inhibit cholesterol synthesis in the liver and inhibit the absorption of cholesterol and bile acids in the intestine.

This study shows that the mean intake before and after the intervention is not statistically significant or in other words that there is no significant difference before and after the intervention.

❒ ISSN 2086-7689 (Print) | 2721-9453 (Online)

It means that the intake of the subjects before and after the intervention was not different, so it can be concluded that the purple sweet potato capsules raised HDL levels.

CONCLUSION

The average HDL level has increased. This research can be used as a basis for developing and continuing further research. The wider community should consume a variety of foods and consume high-fiber foods such as fruits and vegetables every day and maintain an ideal body weight in order to control HDL levels to remain normal.

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