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The Nusantara Diet of Makassar on the ratio of triglyceride to HDL on the risk of cardiovascular disease in individuals with the risk of metabolic syndrome

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ABSTRACT

Introduction: The prevalence of metabolic syndrome in recent decades has increased along with the increasing prevalence of obesity globally. Metabolic syndrome increases a person's risk of developing cardiovascular disease. Non-pharmacological strategies are needed to have a good impact on those at risk, one of which is the Nusantara Diet.

Method: Experimental research with parallel pre-post test randomized clinical trial design, and open label trials. This study compared the triglyceride to HDL ratio values between the Nusantara diet group (DN group) compared to the control group (K group). We involved 50 subjects (25 in the DN group and 25 in the K group) as research respondents.

Result: The mean age of research respondents was 35.1 ± 6.9 years. When viewed from the metabolic syndrome components, 100% were obese based on Asia Pacific BMI criteria with a mean BMI of 30.1 ± 3.2 kg/m^2. The mean abdominal circumference was 98.3 ± 7.7 cm, the mean fasting blood sugar level was 89.2 ± 11.1 gr/dL, 90.0% had normal blood pressure. There were no significantly different between the two groups after intervention TG/HDL (2,6 ± 1,1 vs 3,18 ± 2,2, p = 0,194)

Conclusion: Providing the Nusantara Diet especially Diet Nusantara from Makassar has a positive impact on TG/HDL but there were no significant result on this study.

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KEYWORD

Metabolic health, heart disease, lipid profile, diet.

INTRODUCTION

Indicators belonging to the metabolic, vascular, and inflammatory categories are included in the group of risk factors that constitute metabolic syndrome. The term "metabolic syndrome" (MetS) refers to a condition in which an individual possesses high blood pressure, central obesity, and dyslipidemia, with or without diabetes[1]. If all of these symptoms manifest themselves simultaneously in a single individual, then that individual is at an increased risk of developing macrovascular disease[2]. Since the beginning of the twenty-first century, the prevalence of metabolic syndrome has been steadily climbing alongside the rising prevalence of obesity all over the world[3].

A study in the United States showed that the prevalence of metabolic syndrome in adults increased from 25.3% in 1988 to 34.2% in 2012[3]. In Indonesia, the prevalence of metabolic syndrome in adult males and females is 38 percent and 46 percent, respectively, according to the data[4]. The prevalence of metabolic syndrome in men was approximately 25% in Jakarta in 2006, while the prevalence in women was approximately 30%. This figure has increased since the last research that was conducted in Jakarta in 2006[5]. People who have metabolic syndrome are more likely to acquire cardiovascular disease than those who do not do[3].

According to the World Health Organization (WHO), cardiovascular disease is the leading cause of death from non-communicable diseases (NCDs). It is responsible for 17.5 million deaths, which accounts for 46% of all deaths

caused by non-communicable diseases. Eighty percent of these deaths occur in countries with low to middle incomes, and it is anticipated that this number will rise to 23.6 million by the year 2030[6]. Atheroma plaque, which is caused by damaged or ruptured coronary arteries, is the most common cause of coronary heart disease (CHD). This disorder will become more prevalent as the number of people diagnosed with SM continues to rise[7].

The model of the Mediterranean diet has been utilized extensively in the treatment of metabolic syndrome up until this point. The components of this diet are as follows: a diet that is low in calories, abundant in omega-3 fatty acids, low in glycemic index, abundant in foods that have a high Total Antioxidant Capacity (TAC), moderate to high protein content, and frequent meals[8]. However, the Mediterranean diet is considered less suitable in Indonesia because Indonesians are shorter in body shape and relatively have a body composition that accumulates more fat.

Therefore, Indonesia developed its eating pattern with the Nusantara Diet with original Indonesian ingredients, such as coconut milk and spices. Indonesian food is often wrongly connoted as unhealthy because it uses a lot of coconut milk in its processing. Indonesian food is often considered unhealthy because it uses a lot of coconut milk in its processing. Saturated fat consumed by Indonesians is fat from Medium Chain Fatty Acids (MCFA) which comes from coconut milk and is suitable for obesity management[9,10]. Traditional Indonesian food also uses many spices besides coconut[11].

Consuming foods rich in spices such as garlic, turmeric / curcumin, ginger and other types of spices that are often used in Indonesia are considered to have a good effect in helping reduce the risk of cardiovascular disease[11]. Other herbs such as curcumin have a cholesterol-lowering effect by reducing the absorption of cholesterol from the intestines to the circulatory system[12]. Therefore, we wanted to see the effect of the Indonesian Diet on the ratio of triglyceride and HDL levels on the cardiovascular risk of individual patients with metabolic syndrome.

METHODS

Experimental research with parallel pre-post test randomized clinical trial design, and open label trials. This research has received approval from the Health Research Ethics Committee of the Faculty of Medicine, Hasanuddin University (No. 510/UN4.6.5.31/PP36/2022) and ClinicalTrials.gov (NCT05566197) (Accessed October 4, 2022). This study compared the triglyceride to HDL ratio values between the Nusantara diet group (DN group) compared to the control group (K group). We involved 50 subjects (25 in the DN group and 25 in the K group) as research respondents.

Hasanuddin University in Makassar's Department of Nutrition, which is part of the Faculty of Medicine, had the responsibility of carrying out the research. From September until December of the year 2022. The participants in the study were either male or female, with a range of ages ranging from 18 to 60 years, a body mass index (BMI) of at least 25 kg/m2 at the beginning of the examination, and a willingness to participate in the research by written consent. Our study uses the Asia Pacific BMI criteria. Participants who were pregnant or breastfeeding, as well as those who were allergic to meals produced from coconut or processed coconut, were not allowed to participate in the study. The following are some of the reasons why participants in this study may be asked to withdraw from the study: refusing to follow the instructions for the research, declining to continue the research, and research subjects suffering from serious sickness or death.

After getting approval from the Research Ethics Committee of the Faculty of Medicine at Hasanuddin University, the research participants will be recruited through the use of flayers that will be spread over social media utilizing the WA application. The first data that was obtained consisted of demographic information (such as age, gender, education level, and occupation), as well as data on physical activity based on IPAQ scores that were acquired at the beginning of the research. Information on the amount of food consumed, blood pressure, and anthropometric measurements (including body weight, height, body mass index, and belly circumference) were evaluated both at the beginning of the study and at the conclusion of the study.

Food intake data was obtained from 24 hour food recall. The food intake data obtained was in the form of household measurements, then converted into gram measurements which were analyzed using the Nutrisurvey-2005 program. The research was conducted for 56 days, where the DN group was given the Nusantara Diet in the form of a lunch box every day accompanied by a food intake reminder or food recall within 24 hours via WA and a Nusantara Diet guide which contains a food menu or meal plan for breakfast, snacks and meals. night with a choice of total calories per day of 1700 kcal, 1500 kcal and 1300 kcal.

The group that served as the control did not receive any DN and instead received coaching from 'Fill My Plate' regarding the management of good eating. At the beginning of the trial (Day 0) and at the end of the study (Day 56), blood tests were performed. Prior to the collection of blood samples, all of the participants were required to abstain from food and drink for a period of eight hours. Phlebotomy certification was required for the laboratory professionals who were responsible for collecting the blood samples from the participants. Within the laboratory, a Rhoce Cobas 6000 was utilized for the purpose of conducting a triglyceride and HDL examination.

Statistical data analysis is performed after the data have been acquired, which is followed by the processing of the

data, which is then categorized according to the type of data. Following the completion of a normality test, the researchers proceeded to conduct bivariate testing using SPSS version 26 (IBM SPSS Statistics for Windows, version 26.0. Armonk, New York: IBM Corp). These bivariate tests included unpaired t tests, paired t tests, Mann-Whitney tests, and Wilcoxon tests. A hypothesis is determined by using the study data, and if the p-value is less than 0.05, then the hypothesis is regarded to be statistically significant.

RESULT

This study involved 50 respondents, of which 25 respondents were in the intervention group and the others were in the control group. The characteristics of our respondents are presented in Table 1.

Respondents in this study were generally women (68.0%). The mean age of research respondents was 35.1 ± 6.9 years. When viewed from the metabolic syndrome components, 100% are obese based on Asia Pacific BMI criteria with a mean BMI of 30.1 ± 3.2 kg/m^2. The mean abdominal circumference was 98.3 ± 7.7 cm, the mean fasting blood sugar level was 89.2 ± 11.1 gr/dL, 90.0% had normal blood pressure **(Table 1)**.

Differences in TG/HDL (3.0 ± 1.8 vs 2.6 ± 1.1; p = 0.669) intervention and control groups before the study began was not significant based on statistical tests. This shows that the initial characteristics of the respondents in this study are equivalent and TG/HDL (2.4 ± 0.9 vs 3.1 ± 2.2; p 0.194) levels in the intervention group was lower after undergoing the intervention. **(Table 2)**.

Table 2. Comparison of lipid profiles of the intervention and control groups before and after the study

	Intervention	Control	p
Before Intervention			
TG/HDL +	3.0 ± 1.8	2.6 ± 1.1	0.669
After Intervention			
TG/HDL	2.4 ± 0.9	3.1 ± 2.2	0.194

* significant; + Mann-Whitney test.

Table 1. Characteristics of study respondents

	n	%	Mean	SD
Sex				
Male	16	32.0		
Female	34	68.0		
Age (y.o)			35.1	6.9
Body mass index(Kg/m^2)			30.1	3.2
Obesity	50	100.0		
Non Obesity	0	0		
Abdominal circumference (cm)			98.3	7.7
Fasting blood glucose (gr/dL)			89.2	11.1
Blood pressure				
Normal	45	90.0		
High	5	10.0		
Activity				
Mild	7	14.0		
Moderate	38	76.0		
Severe	5	10.0		

DISCUSSION

According to the findings of this investigation, the participants' total cholesterol and high-density lipoprotein levels were comparable prior to participating in the study. When the two groups' total cholesterol and high-density lipoprotein levels were compared, there were no significant differences between them and the control group. However, there was a trend for the intervention group to have lower levels. Triglycerides are a good indicator of a metabolic condition that is not optimal. It has been demonstrated through research that TG can be utilized as a predictor of cardiovascular disease on its own[13].

Those in the intervention group who saw a rise in their HDL levels have a positive image. The risk of coronary heart disease is inversely connected to HDL cholesterol, which is an essential component in alleviating cardiovascular risk[14]. The apolipoprotein (apo)A1 protein, which is the primary component of HDL, has been demonstrated to both prevent and heal atherosclerosis. There are a number of atheroprotective properties that HDL and apoA1 possess. These functions include the enhancement of endothelial function, the inhibition of vascular inflammation, and the enhancement of cholesterol clearance in the arterial wall. As a result, HDL-C and apoA1 have being studied as potential therapeutic targets for coronary heart disease[15].

In this particular research investigation, the Nusantara Diet was found to be connected with an increase in HDL, which means that it has the potential to be utilized as a non-pharmacological therapeutic technique. The Nusantara Diet is a dietary guide that is minimal in calories and sodium and is based on the culinary menus of various regions. Coconut is just one of the many spices that are used in traditional Indonesian cuisine. According to the findings of Lipoeto's research, the Nusantara Diet is comprised of a wide variety of herbs and spices that are abundant in antioxidants[10]. There are a variety of biological effects that flavonoids have, including the improvement of lipoprotein profiles, the reduction of LDL oxidation, and the reduction of platelet aggregation[16].

Several studies have shown that flavonoids can inhibit or sometimes initiate several enzyme systems[16]. Most of the time, coconut milk is used extensively in Indonesian cuisine. According to research, diets that include coconut milk do not have any negative effects on the lipid profile of the general population. In fact, these diets are helpful since they induce a reduction in low-density lipoprotein (LDL) and an increase in high-density lipoprotein for the general population[17]. The results of the study also shown that the intervention group experienced a greater drop in the ratio of total cholesterol to high-density lipoprotein (HDL)[18].

According to Mente et al. (2009), there is a causal connection between the amount of fat consumed in one's diet and coronary heart disease. They discovered substantial evidence of a real benefit link between the consumption of vegetables, nuts, and spices, as well as a negative association with foods that include trans fats and foods that have a high glycemic index/load. It is not possible to establish a causal connection between the consumption of polyunsaturated fats, total fats, alpha linolenic acid, eggs, and milk leading to ischemic heart disease because there is not enough data to support such a connection[18].

Previous research has demonstrated that there is a correlation between CHD and metabolic syndrome, as well as a link between elevated triglycerides and low HDL levels. With insulin resistance and central obesity, both of which are associated with coronary heart disease risk, there is a strong correlation between the TG/HDL ratio, which is a descriptive metric as well[19]. The ROC curve analysis that we conducted to determine the association between the ratio of total cholesterol to HDL and the occurrence of metabolic syndrome did not demonstrate enough reliability (area under the ROC curve < 0.5). On the other hand, the ratio of total cholesterol to high-density lipoprotein is linked to coronary heart disease risk. Previous studies have demonstrated the correlation between the ratio of total cholesterol to HDL in predicting coronary heart disease (CHD) risk. ratio of total cholesterol to high-density lipoprotein cholesterol, with a sensitivity of 75% and a specificity of 39%, respectively[20].

According to the Council for Cardiology Practice of the European Society of Cardiology (ESC), levels of the TG/HDL-C ratio that are greater than 2.75 in men and greater than 1.65 in women are proven to be significantly predictive of metabolic syndrome (MetS), as well as the incidence of coronary disease, regardless of the body mass index (BMI)[19]. According to Borrayo et al. (2018), there is a correlation between TG/HDL and body mass index (BMI) ($r = 0.194$, $p = 0.01$), visceral adipose tissue ($r = 0.193$, $p = 0.002$), blood glucose ($r = 0.367$, $p = 0.001$), insulin ($r = 0.354$, $p = 0.001$), and HOMA-IR ($r = 0.396$; $p = 0.001$)[21].

With a TG/HDL ratio that is greater than 3.5, it is possible to make a prediction about the occurrence of cardiovascular disease and mortality from coronary heart disease in the future[22]. In addition, those with a TG/HDL ratio >3.5 are 2 times more likely to develop diabetes than those with a ratio <3.5 [23]. The ratio of total cholesterol to high-density lipoprotein was also linked to hypertension, hypercholesterolemia, and hypertriglyceridemia in both males and females. Triglyceride levels in the serum that are elevated are typically linked to a reduction in HDL-C and an increase in LDL overall. Triglycerides, in and of themselves, are a significant risk factor for cardiovascular events; however, categorizing individuals according to their HDL levels offers a more precise method of identifying those who are already at a high risk[24].

Limitation of this study was respondents' adherence to the mealplan. Future research may suggest giving food packages three times a day to avoid different meals from mealplan.

CONCLUSION

Providing the Nusantara Diet especially Diet Nusantara from Makassar has a positive impact on TG/HDL but there were no significant result on this study.

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