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Original Article

Stress Factors and Macronutrient Intake to Total Cholesterol Levels and HDL Levels in Overweight Female Students

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ABSTRACT

Being overweight is one of the many health problems that occur in modern times. Stress and macronutrient intake are factors that can affect the occurrence of increased cholesterol levels and decreased HDL in overweight. This study aimed to determine the relationship between stress factors and macronutrient intake on cholesterol and HDL levels. This research uses a cross-sectional design with a purposive sampling method, namely selecting subjects with certain criteria. The number of subjects was 50 Overweight female students based on the population proportion sample formula calculation. Stress data was measured using the Depression, Anxiety, and Stress Scale (DASS 42) questionnaire and macronutrient intake data using a 24-hour food recall form. Data analysis using the Chi-square test. The results obtained stated that 30% of respondents had high cholesterol levels, 2% of respondents had low HDL levels. As many as 22% of respondents experienced stress, the carbohydrate intake of 80% of respondents was inadequate, the protein intake of 96% of respondents was inadequate, the fat intake of 96% of respondents was inadequate. Analysis of the relationship between stress and total cholesterol (p=0.152), carbohydrate intake (p=0.416), protein (p=0.331) fat (p=0.669) with total cholesterol levels, carbohydrate intake (p=0.080) protein (0.960) fat (0.960) with HDL levels. Stress factor with HDL levels (p=0.044). It can be concluded that there is no relationship between stress factors, carbohydrate, protein and fat intake with total cholesterol levels. There is no relationship between carbohydrate, protein and fat intake with HDL levels. There is a significant relationship between stress factors and HDL levels in overweight female students.

Keywords: *HDL, Macronutrient Intake, Overweight, Stress Factor, Total Cholesterol*

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INTRODUCTION

The problem of excess nutrients, often called overweight, is a health problem that occurs in modern times because the prevalence is increasing yearly[1]. The results of the prevalence data showed that 11% of men and 15% of women were overweight[2]. Basic Health Research Data (RISKESDAS) in 2018 states that the prevalence of overweight in Indonesia is 13.6%, with the proportion of excess body weight in the age group of >18 years. The prevalence of overweight for the >18 age group in East Java Province based on the 2018 Riskesdas is 13.75%[3].

Total blood cholesterol levels tend to increase in people who are overweight and lack exercise[4]. High cholesterol levels of >240 mg/dl[5]. HDL cholesterol, which is often

referred to as good cholesterol, has more protein molecules than fat. The lower the cholesterol HDL levels, the greater the risk of being overweight[6]. HDL cholesterol is low if levels reach <40 mg/dl and HDL cholesterol is high if it comes to>60 mg/dl[7]. Stress can have an impact on the body in the form of an increased risk of overweight, obesity, hypertension, and other disorders due to hormonal changes during stress; hormones that are stimulated during stress are adrenaline and cortisol; these hormones have a metabolic effect on carbohydrates, lipids and proteins by increasing the mobilisation of the body's energy stores[8].

This study aims to find out how stress and macronutrient intake affect total cholesterol and HDL levels in overweight college female students. The results of this study are expected to provide information about the relationship between stress factors, macronutrient intake, total cholesterol levels and HDL levels with the incidence of overweight in female students.

METHOD

The study design used a cross-sectional method. The research location is at Darussalam Gontor University Female Campus, from November 25th to December 25th 2022. The population in this study was all female students in University of Darussalam female campus who were overweight and between of 18 and 25. This study, we will use purposive sampling, which is choosing subjects with certain criteria. Inclusion Criteria: Respondents must achieve BMI >25-27 and can be overweight, Respondents men >18-25 years. Exclusion Criteria: Female students are afraid of needles because in this study a blood collection will be held. Respondents are taking special drugs such as niacin drugs (Vitamin B3), arginine drugs and statin drugs, because taking these drugs can affect cholesterol levels in blood. This research was submitted and carried out by a predetermined procedure in the form of an approval letter from the ethical clearance section at the Health Research Ethics Committee (KEPK) Faculty of Semarang State University with the number: 553/KEPK/EC/2022. Dependent variable: Stress factors and macronutrient intake, independent variable: Total cholesterol levels, HDL levels and Overweight. In this study using tools provided by the Widodo Medika laboratory with the hematology analyzer or device general care, this tool was used for checking cholesterol and HDL levels, cholesterol level examination reagents using the Wiener brand type, and HDL examination reagents using the Shimatzu brand type, stril test tubes (Vacutainer Tubes) for the placement of blood samples, for all tools and materials in this study, especially in checking cholesterol and HDL levels provided by Widodo Medika laboratory.

Anthropometric measurements include weighing using weight scales with the GEA medical EB 9360 brand type and height measurements using portable stadiometer brand microtoice; 24-hour food recall method which carried out 3 times a week to determine the intake of macronutrients consumed by respondents. Measurement of stress levels using the Depression Anxiety and Stress Scales (DASS). Anthropometric measurements were carried out by researchers at one time and then BMI calculations were carried out to determine the excess weight of research subjects. The data that had been collected was then processed manually in the editing, coding and entry processes. Bivariate data analysis using Chi Square test.

RESULTS

Table 1 the relationship between stress factors and macronutrient intake with cholesterol levels in this study shows that there was no significant relationship between stress factors, carbohydrate, protein and fat intake with total cholesterol levels, corroborated by the results of p-value 0.152, p-value 0.416, p value 0.331, p value 0.669.

Table 2 the relationship between stress factors and HDL levels shows the p-value of 0,044 that p-value <0.05. Based on statistical tests there is a significant relationship between stress factors and HDL levels, but the results show that there is no significant relationship between carbohydrate, protein and fat intake with p-value 0,08, p-value 0,960, and p-value 0,960..

Table 1. The Relationship of Stress Factors and Macronutrient Intake with Total Cholesterol Levels

		Cholesterol				
		Normal		High		p-value
		n	%	n	%	
Stress Factors	Normal	34	87,2	5	12,8	
	Mild	4	57,1	3	42,9	0,152*
	Severe	3	75,0	1	25,0	
Carbohydrate	Adequate	9	90,0	1	10	0,416*
	Inadequate	32	80,0	8	20,0	
Protein	Adequate	1	50,0	1	50,0	0,331*
	Inadequate	40	83,3	8	16,7	
Fat	Adequate	2	100	0	0	
	Inadequate	39	81,2	9	18,8	0,669*

**Chi-Square*

Table 2. The Relationship of Stress Factors and Macronutrient Intake with HDL Levels

		Normal		Low		p-value
		n	%	n	%	
Stress Factors	Normal	39	100,0	0	0	0,044*
	Mild	6	85,7	1	14,3	
	Severe	4	100,0	0	0	
Carbohydrate	Adequate	10	100	0	0	0,08*
	Inadequate	39	97,5	1	2,5	
Protein	Adequate	2	100	0	0	0,960*
	Inadequate	47	97,9	1	2,1	
Fat	Adequate	2	100	0	0	0,960*
	Inadequate	47	97,9	1	2,1	

DISCUSSION

According to research conducted by Kadir (2010), he explains hormonal changes that occur in stressful states and their effects on metabolism[8]. These metabolic changes will be influenced by changes in the hormones cortisol and epinephrine that increase in times of stress. The effects of cortisol and epinephrine will mobilize stores of fat and fatty acids in the blood[9]. These metabolic changes will be influenced by changes in the hormones cortisol and epinephrine that increase in times of stress. The effects of cortisol and epinephrine will mobilize stores of fat and fatty acids in the blood[10]. When the body is stressed, it will release the hormone cortisol, and a high cortisol level will make the brain arouse hunger[11]. In this study, respondents could not divide their time between academic activities and daily activities, causing respondents to stress and often stay up late to do academic assignments, this factor caused respondents to consume food in the middle of the night. increase in the hormone cortisol during stress, food intake is not controlled, which it affects the increase in cholesterol and the decrease in HDL levels[12].

The nonsignificant relationship between macronutrient intake and total cholesterol levels[13-19]. Respondents who have arranged to consume carbohydrate food sources unconsciously have regulated blood sugar and insulin to remain normal, these settings result in blood cholesterol levels in the body remaining normal so that there is no buildup or deposition in the arteries[18]. Other risk factors that affect body mass index and lipid profile levels cannot be changed such as age, genetic factors, or heredity[20]. Physical activity factors also affect

the formation of total cholesterol and an increase in HDL levels. The more physical activity a person does, the less total cholesterol and LDL, are formed and HDL levels[10].

The results of the questionnaire on the food recall revealed that respondents frequently ate tofu and tempeh vegetable proteins. Tempeh is a food that has a lot of protein, and consists of amino acids that contain arginine, glycine and alanine[15]. The amino acid composition explains the ability of soy to regulate the ratio of insulin or glucagon levels, while the serum concentration of glucagon depends on the composition of the protein consumed. The benefits of arginine have the opposite properties to lysine and methionine in animal proteins which tend to increase cholesterol levels[16]. Based on the research conducted, and the results obtained, there is no significant relationship between fat intake and total cholesterol levels, it is influenced by the dietary intake of respondents who consume vegetable side dishes more often than animal side dishes.

Yulianti's (2015) research is in line with this study, which explains the significant relationship between carbohydrate, protein, and fat intake with HDL levels[3]. In the results of the food recall interview, respondents consumed as much non-refined carbohydrates as refined carbohydrates. Refined-type carbohydrates are carbohydrates that have undergone processing so that there are changes in structure, macronutrient content and fiber content, some are also processed with added sugar or salt[3].

This study also explains the consequences of eating and drinking excessively. When someone consumes to much food, it will greatly affect the health of the body. Regarding consumption in an Islamic point of view, there is a concept of division of *haram* and *halal* in commodities consumed by humans, *israf* and *mubazir* as excessive consumption behavior and crossing the limit is a form of consumption behavior prohibited by Islam, the existence of this concept is evidence that Islam upholds the ethics of consumption [21].

CONCLUSION

There is no significant relationship between stress factors and cholesterol levels, a significant relationship between stress factors and HDL levels, and no significant relationship between macronutrient intake and total cholesterol levels and HDL levels.

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