

ASSOCIATION OF MACRONUTRIENT INTAKE WITH PERCENTAGE OF VISCERAL FAT IN INTERNATIONAL STUDENT AT UNIVERSITAS AIRLANGGA SURABAYA

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ABSTRACT

Diets are often associated with nutritional status of a person. Good nutritional status always accompany a good diet, if the intake of food is good, then it will give a good nutritional status as well. If energy intake exceeds output energy along with low physical activity, so it can lead to a build up of fat and increase the risk of overweight and obesity. The purpose of this research was to analyze the relationship between macronutrient intake with visceral fat on foreign students Universitas Airlangga in Surabaya. This study is observational, cross-sectional research design. The research sample was 65 students, where subjects was determined by purposive with inclusion criteria that had stayed at least 6 months in Indonesia, healthy, and not on a diet. The independent variable is the level of macro nutrient adequacy. The dependent variable is the visceral fat. Data were analyzed using chi-square test with a significance level of <0.05 and linear regression. Results showed that there was a significant relationship between energy sufficiency level ($p = 0.000$) and fat ($p = 0.018$) with percentage of visceral fat. Every 1% increase in level of energy sufficiency, respondent's percentage of visceral fat will increase by 3.589. Every additional 1% of level of fat sufficiency, percentage of visceral fat will increase by 1.712. The higher the intake of energy and fat, there will be an increase in visceral fat. The conclusion of this study is energy and fat intake can increase visceral fat. Increasing energy sufficiency and fat will increase visceral fat as well.

Keywords: macronutrients, visceral fat, foreign student

INTRODUCTION

In Indonesia, in 2016 the Ministry of Research, Technology and Higher Education issued 6,967 study permits for foreign students (Suwignjo, 2017). The interest of foreign students in studying in Indonesia is increasing. Foreign students who apply for higher education in Indonesia range from 100-500 application letters per week which are sent to the Ministry of Research, Technology and Higher Education (Suwignjo, 2017). In Surabaya, there are several universities that have programs for foreign students such as Petra Christian University, Surabaya University (UBAYA), Ten November Institute of Technology (ITS), and Universitas Airlangga (UNAIR).

Foreign students are students who come and move from their home country to another country, bringing the values, habits, beliefs, and behavior of their country of origin (Wijaya, 2013). For some people studying in another country is a challenge in itself. Following educational programs at

tertiary institutions in other countries will provide opportunities to be able to learn languages, cultures and gain meaningful life experiences for students who do (Amanah, 2015).

Switching regions can lead to changes in diet and diet. These changes are adjusted to the environment or country in which they live. Based on the results of research in several countries, if the new migrant population maintained their diet, then a person had a lower risk of disease than the native population of that country (Tobias et al., 2012).

A person's diet can be influenced by cultural factors. Cultural differences can also lead to differences in eating patterns between individuals. Cultural factors influenced a person in behaving and fulfilling basic biological needs, including food needs (Sulistyoningsih, 2011).

Previous research has shown a decrease in the amount of intake by about $\pm 20\%$ among foreign students in Surabaya. This occurred due to differences in cultural environments that made

it difficult for foreign students to adapt and the lack of access to food. Foreign students found it difficult to find local food, besides that foreign students often skip their meals, only 1-2 times a day (Levina and Muniroh, 2018).

A person's health condition is also determined by physical activity. If the energy consumed is excessive, it is not the same as the energy expended and added with less physical activity, it can cause weight gain, increasing the risk of obesity and obesity (Mahardikawati et al., 2008). Diet has a positive relationship with obesity status. This is in line with high body fat and visceral fat deposits (Putri et al., 2017).

Visceral fat is fat in the body that accumulates in the central part of the body and wraps around the internal organs of the body. Excess visceral fat is associated with the incidence of central obesity. Central obesity is associated with an increased risk of degenerative diseases (Sugianti et al., 2009). This research was conducted to identify the intake of macro nutrients through the adequacy level of intake with the percentage of visceral fat, for foreign students at Universitas Airlangga, in Surabaya.

METHODS

This research was conducted with a cross-sectional design with 65 respondents of foreign students studying at Universitas Airlangga, Surabaya. Respondents were selected using purposive sampling, with the inclusion criteria of foreign students who have lived in Indonesia for at least 6 months, were in good health and were not on a diet. Respondents who had met the inclusion criteria were contacted via email to ask about their willingness to be the respondent, their health status and diet. Email addresses were obtained from Airlangga Global Engagement (AGE) until the number of respondents was met.

The data were taken from May to June 2019. The method used when data collection was face-to-face interviews followed by measuring body visceral fat. Macro nutritional intake data were obtained from a 2x24 hour food recall questionnaire. The intake data were analyzed using Nutrisurvey software to determine the amount of macro nutrient intake, then compared with the

Nutritional Adequacy Rate (RDA). Adequacy of macro nutrients was said to be sufficient if it meets 80% -110% of the RDA (WNPG, 2004).

Data on the visceral fat percentage of foreign students were obtained through direct measurement using Bioimpedance Analysis (BIA) Omron HBF-375. Percentage of foreign students visceral fat compared with cut-off from Omron Healthcare. The percentage of visceral fat was categorized as normal if $\leq 9\%$, high if $> 9\%$ to $\leq 14\%$, and very high if $> 14\%$. Data analysis used SPSS 21 software by performing a Chi-square test to analyze the relationship between macro nutrient intake and visceral fat. The significance value used < 0.05 . To find out how much influence the intake of macro nutrients has on the percentage of visceral fat, a linear regression test was carried out on the adequacy of energy and fat with the percentage of visceral fat. This research has received approval from the Faculty of Nursing Ethics Commission on May 7, 2019 with number 1387-KEPK.

RESULT AND DISCUSSION

Respondents Characteristic

Table 1 shows that most of the respondents (52.3%) were young adults (18-25 years). Age has a significant relationship with the incidence of central obesity (Nurrahmawati and Fatmaningrum, 2018). Most of the respondents (66.2%) are

Table 1. Distribution of Characteristics of Foreign Students of Airlangga University, Surabaya, 2019

Variable	n	(%)
Age		
18 – 25 years old	34	52.3
26 – 40 years old	31	47.7
Gender		
Male	24	37
Female	41	63
Education		
Strata 1	19	29.2
Strata 2	43	66.2
Strata 3	3	4.6
Continent Origin		
Asia	46	70.8
Africa	19	29.2

Table 2. Description of the total intake of foreign students at Airlangga University, Surabaya, 2019

Variable	Total
Energy intake (kcal)	
Mean ± SD	1781 ± 359
Minimum	1193
Maximum	2586
Protein intake (g)	
Mean ± SD	66.15 ± 16.33
Minimum	38.1
Maximum	102.7
Fat intake (g)	
Mean ± SD	69.7 ± 20.7
Minimum	28.05
Maximum	123.75
Carbohydrate intake (g)	
Mean ± SD	224.56 ± 51.93
Minimum	121.95
Maximum	374

currently pursuing a Masters degree and the largest number of respondents are from postgraduate faculties. A person's education is very influential with the level of one's individual knowledge, so that it will increase awareness of healthy living habits (Rahajeng and Tuminah, 2009).

More female respondents (63%) than male respondents (27%). Female gender had a significant relationship with the incidence of central obesity. Women had a 1.7 times higher risk of experiencing central obesity than men (Puspitasari, 2018). Most of the respondents came from the Asian continent (70.8%), such as Myanmar, Malaysia, Yemen, Timor Leste, Palestine, Pakistan, Syria and Syria. In addition, there were respondents who came from the African continent, namely from Madagascar, Malagasy, Nigeria, Rwanda, Uganda, Zimbabwe, Tanzania, Ethiopia, and Kenya.

Intake and Adequacy of Respondents' Macro Nutrients

Table 2 shows that the average energy intake of foreign students was 1.781 kcal, protein was 66.15 g, fat was 69.7 g and carbohydrate was 224.56 g. Table 3, shows that most (78.5% and 81.5%) the level of energy and carbohydrate adequacy of foreign students was in the low category. As much as 43.1% had a less adequate

Table 3. Adequacy of Macro Nutrients for Foreign Students at Airlangga University, Surabaya, 2019

Variable	n	(%)
Energy Adequacy		
Inadequate (<80% RDA)	51	78.5
Sufficient (80-110% RDA)	12	18.5
Excessive (>110% RDA)	2	3.1
Protein Adequacy		
Inadequate (<80% RDA)	8	13.3
Sufficient (80-110% RDA)	18	27.7
Excessive (>110% RDA)	39	60
Fat Adequacy		
Inadequate (<80% RDA)	28	43.1
Sufficient (80-110% RDA)	14	21.5
Excessive (>110% RDA)	23	35.4
Carbohydrate Adequacy		
Inadequate (<80% RDA)	53	81.5
Sufficient (80-110% RDA)	11	16.9
Excessive (>110% RDA)	1	1.5

Table 4. Foreign Student Viseral Fat Level at Airlangga University Surabaya, 2019

Level	n	(%)
Normal	53	81.5
High	10	15.4
Very high	2	3.1

level of fat and 60% had a more adequate level of protein

Visceral Fat Level

Table 4 shows more than 80% of foreign students had visceral fat in the normal category and less than 20% have abnormal levels. Central obesity can be seen based on the size of the waist circumference. High visceral fat affects waist circumference and can increase the risk of central obesity (Gadekar et al., 2018).

Relationship between Macro Nutrient Intake and Viseral Fat

The results of this study indicated that there was a significant relationship ($p < 0.05$) between energy and fat intake and the percentage of visceral fat among foreign students at Universitas Airlangga, Surabaya. The intake of protein and carbohydrates with visceral fat in foreign students

Table 5. Results of Chi-Square Test between Macro Nutrient Intake and Visceral Fat for Foreign Students at Universitas Airlangga, Surabaya, 2019

Nutrient	p-value
Energy	0.000
Protein	0.261
Fat	0.018
Carbohydrate	0.188

at Universitas Airlangga, Surabaya did not show a significant relationship ($p > 0.05$). Supported by the research of Nurrahmawati and Fatmaningrum (2018) where there was no significant relationship between carbohydrate and protein intake with the incidence of central obesity.

Based on the results of the linear regression test above, the regression function for energy adequacy was $Y = 0.898 + 3.589X$ and for fat adequacy was $Y = 2.038 + 1.712X$. Each additional 1% level of energy sufficiency, the percentage of visceral fat of the respondent will increase by 3.589. For every 1% increase in the adequacy level of fat, the percentage of visceral fat will increase by 1.712. The higher the energy and fat intake, the increase in visceral fat will occur.

Another study conducted by Sholuhiyah (2018) showed a significant relationship between the level of energy adequacy and visceral fat ($p = 0.037$). High levels of energy sufficiency will be followed by high visceral fat. In contrast to Sofa's research (2018) where there was no significant relationship between visceral fat and food intake.

The size of the waist circumference can be affected by the level of visceral fat. The risk of experiencing central obesity can increase due to the higher percentage of visceral fat (Gadekar et., 2018).

Central obesity can occur when more energy in the form of food enters the body than the energy needed or used and will be stored in the form of fat. Excess fat will be accumulated in the abdominal adipose tissue in the form of triglycerides. High calorie intake, lifestyle modernization, and low physical activity are other factors that cause central obesity (Pahlevi, 2012).

Central obesity is associated with an increased risk of degenerative diseases (Sugianti et al., 2009). Degenerative diseases in question such

as cardiovascular disease, dyslipidemia, diabetes mellitus II, hypertension, and insulin resistance.

CONCLUSION

Energy and fat intake were significantly associated with visceral glue. The higher the intake of energy and fat that is not used by the body, it will be stored and accumulated into fat and the higher the level of visceral fat. The intake of carbohydrates with protein was not significantly associated with visceral fat. The greater the energy intake and fat accumulated, the visceral fat will increase.

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