

Original Research Article

Association between carbohydrate and fat intake and estradiol levels with body fat percentage in Minangkabau ethnic premenopausal women, in Padang City West Sumatra year 2018

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ABSTRACT

Background: Excessive carbohydrate and fat intake with excess estradiol levels will cause an increase in body fat percentage, thus causing obesity in premenopausal women. Objective was to determine the association between carbohydrate intake with fat percentage, the association between fat intake with fat percentage, the association between SAFA intake with fat percentage, the association between MUFA intake with fat percentage, the association between PUFA intake with fat percentage, and the association between estradiol levels with fat percentage in Minangkabau ethnic premenopausal women in Padang City, West Sumatra.

Methods: This research was carried out in Padang City. Research conducted was observational research with cross sectional research design. Subjects in this research were 52 people. Variables in body fat percentage were measured using Bioelectrical Impedance Analysis (BIA), carbohydrate and fat intake data were obtained by interviewing the Food Frequency Questionnaire (FFQ), and estradiol levels were examined by ELISA. Data analysis was performed using Pearson correlation test.

Results: In premenopausal women in the city of Padang, low carbohydrate intake was found with an average of 227.25grams, high fat intake was found with an average of 77.84grams, high SAFA intake was found with an average of 27.59grams, low MUFA intake was found with an average of 9.91grams, normal PUFA intake was found with an average of 9.37grams, normal estradiol levels was found with an average of 145.95pg/ml, and more fat percentage was found with an average of 33.31.

Conclusions: There was an association between carbohydrate intake with fat percentage, there was an association between fat intake with fat percentage, there was an association between SAFA intake with fat percentage, there was an association between MUFA intake with fat percentage, there was an association between PUFA intake with fat percentage, and no association between estradiol levels with of fat percentage in premenopausal women in Padang City.

Keywords: Carbohydrate intake, Fat intake, Estradiol levels, and body fat percentage, Premenopausal women

INTRODUCTION

The climacteric period for women is a worrying change because there is a physiological change in the life cycle of women. This premenopausal period is characterized by

the transition of the body condition into menopause. In the premenopausal period, there will be some changes, namely the decline in reproductive function in the body, hormonal changes and physical changes, as well as psychological changes.¹

By 2030 the number of menopausal women is estimated to reach 1.2 billion people.² In 2016, premenopausal women in Indonesia reached 24,114,776 people.³ In West Sumatra the number reached 2,642,255 people. In Padang City, premenopausal women totaled 25,433 people.⁴

Estrogen is a major regulator in the development of adipose fat in premenopausal women. Reduced estrogen levels in the body will increase visceral fat accumulation, thus resulting in increased fat adipocytes in premenopausal women.⁵

Excessive diet, especially foods that contain lots of carbohydrates and fats which are inappropriate with the body daily needs, can lead to overweight or obesity.⁶ Consumption of high-fat foods will increase blood fat levels.⁷

Degenerative diseases tends to increase over time. Degenerative diseases such as diabetes, hypertension, stroke, and joint disease/rheumatism/gout tends to increase in prevalence over time. The prevalence of high blood pressure in women (32.9%) is higher than that of men (28.7%). This phenomenon is predicted to continue. One of the risk factors for degenerative diseases is excessive diet. Other risk factors for degenerative diseases is obesity.⁸

METHODS

This research was carried out in Padang City Padang from July 2017 - October 2018. Research conducted was

observational research with cross-sectional research design. The population was in the study of Minangkabau ethnic premenopausal women in Padang City, West Sumatra. Subjects in this research were premenopausal women numbered 52 people. In this study, a multi-stage random sampling technique was used.

Inclusion criteria were willing to take part in the study by signing a concent informed, aged 40-55 years at the time of the study, ethnic Minangkabau, experiencing menstrual disorders, and willing to be the subject of research and blood drawn for examination in labor.

Exclusion criteria are not coming and not being able to be found during research data collection and not using contraception or hormonal drugs. Variables in body fat percentage were measured using Bioelectrical Impedance Analysis (BIA), carbohydrate and fat intake data were obtained by interviewing the Food Frequency Questionnaire (FFQ), and estradiol levels were examined by ELISA in Biomedical Laboratory, Faculty of Medicine, Andalas University. The data obtained were tested for normality by the Kolmogorov Smirnov test then processed with Pearson correlation test. This research has passed the code of ethics exam with number 279/KEP/FK/2017.

RESULTS

After conducting research and examining the results of 52 premenopausal women in Padang City. The results are shown in the following Table:

Table 1: Carbohydrate intake, fat intake, SAFA intake, MUFA intake, PUFA intake, and estradiol levels with body fat percentage of premenopausal women in Padang City.

Variable	Mean±SD	Lowest	Highest
Carbohydrate intake (gram)	227.25±35.87	174.72	338.11
Fat intake (gram)	77.84±9.92	52.60	95.65
SAFA intake (gram)	27.59±1.70	20.91	31.26
MUFA intake (gram)	9.91±3.14	4.21	16.11
PUFA intake (gram)	9.37±2.88	3.39	16.74
Estradiol (pg/ml)	145.95±51.20	56.67	310.04
Fat Percentage (%)	33.31±1.66	30.21	36.90

The data above showed that mean±SD carbohydrate intake was 227.25±35.87grams, the lowest carbohydrate intake was 174.72grams and the highest carbohydrate intake was 338.11 grams. Mean±SD fat intake was 77.84±9.92gram, with the lowest fat intake was 52.60grams and the highest fat intake was 95.65grams. Mean±SD SAFA intake was 27.59±1.70grams, with the lowest SAFA intake was 20.91grams, and the highest SAFA intake was 31.26grams. Mean±SD MUFA intake was 9.91±3.14grams, with the lowest MUFA intake was

9.04grams, and the highest MUFA intake was 16.11grams. Mean±SD PUFA intake was 9.37±2.88grams, with the lowest PUFA intake was 3.39grams and the highest PUFA intake was 16.74grams. Mean±SD estradiol levels was 145.95±51.20pg/ml, with the lowest estradiol level was 56.76pg/ml and the highest estradiol level was 310.04pg/ml. Mean±SD body fat percentage was 33.31±1.66%, with the lowest body fat percentage was 30.21% and the highest body fat percentage was 36.90%.

Table 2: Association between carbohydrate intake, fat intake, SAFA intake, MUFA intake, PUFA intake, and estradiol levels with body fat percentage of premenopausal women in Padang City.

Variable	n	r	r ²	p value	
Fat Percentage	Carbohydrate intake	52	0.45	0.164	0.03
	Fat intake	52	0.503	0.253	0.000
	SAFA intake	52	0.648	0.42	0.000
	MUFA intake	52	0.651	0.424	0.000
	PUFA intake	52	0.413	0.17	0.002
	Estradiol level	52	-0.36	0.001	0.802

Based on the table above it was known that there was an association between carbohydrate intake, fat intake, SAFA intake, MUFA intake, and PUFA intake with the body fat percentage, but there was no association between estradiol levels and body fat percentage, with p value = 0.802.

DISCUSSION

Association between estradiol levels with percentage of body fat in premenopausal women in Padang City

Correlation test between estradiol levels and body fat percentage showed r value = -0.36 and p value = 0.802. Based on the bivariate analysis there was no association between estradiol levels and body fat percentage of premenopausal women in Padang City. This result is in line with previous studies conducted which showed that there was no correlation between estradiol levels and body fat percentage.⁹ Based on the literature, estradiol does not affect body fat percentage. 80% of Estradiol is excreted in the urine and, the remaining 20% is excreted in bile.¹⁰ However, research conducted has different results, namely, there was a correlation between estradiol levels and body fat percentage. This result is obtained because the inspection method used is the same.¹¹

In the results of this study, it was found that estradiol levels in premenopausal women in Padang City were normal, therefore estradiol levels in premenopausal women must be maintained to maintain health status. Normal estradiol levels are very important in premenopausal women in order to avoid symptoms caused during the premenopausal phase such as irregular menstrual cycles, prolonged menstrual bleeding and relatively large amounts of menstrual blood which sometimes accompanied by menstrual pain/dysmenorrhoea.¹²

Correlation of carbohydrate intake with percentage of body fat in premenopausal women in Padang City

The results of the correlation of carbohydrate intake with body fat percentage showed the r value = 0.503 and p = 0.000. Based on the bivariate analysis, there was an

association between carbohydrate intake and body fat percentage of premenopausal women. These results were in line with previous research conducted which showed that there was a correlation between carbohydrate intake and body fat percentage.¹³ In addition stated that the percentage of body fat increases if the intake of carbohydrates is high.¹⁴ In addition, the research conducted stated that there was an association between body fat percentage with high carbohydrate intake.¹⁵ The study also concluded that excessive carbohydrate intake in premenopausal women can cause excessive body fat percentage. Based on the literature, excessive diet, especially foods that contain lots of carbohydrates that are inappropriate with the body needs can lead to an increase in the percentage of body fat.⁶

Results of this study showed that the carbohydrate intake of premenopausal women in the city of Padang are still lacking, therefore carbohydrate intake in premenopausal women must be increased to meet the needs of carbohydrates. Carbohydrates are the main energy source of energy, which is needed by the body to carry out all activities.

Association between fat intake with percentage of body fat in premenopausal women in Padang City

Results of the correlation test between fat intake with body fat percentage showed the r value = 0.503 and p = 0.000. Based on the bivariate analysis, there was an association between fat intake and body fat percentage in premenopausal women. This result was in line with previous research conducted which showed that there was a correlation between fat intake and body fat percentage.¹⁶ Based on the literature, consumption of high-fat foods will increase visceral fat, thus increasing body fat percentage.¹⁷

The results of this study showed that fat intake in premenopausal women in Padang City are higher. Fat intake affects the body fat in premenopausal women, because unused fat deposits will increase harmful fat levels in the body if it is not accompanied by physical activity and consumption of high fiber foods, and protection from infectious diseases. High fat intake will

cause body fat percentage to increase so that it can cause obesity. Obesity can put a person in a risk suffering degenerative diseases such as hypertension, diabetes mellitus, coronary heart disease (CHD). Results of this study showed higher fat intake, so the fat intake of premenopausal women must be reduced.

Food ingredients which act as the main sources of fat that must be reduced by premenopausal women in Padang City, include plant oils (coconut oil, palm oil, peanuts, soybeans, corn, etc.), butter, margarine, and animal fats (meat fat and chicken). Other sources of fat are nuts, seeds, meat and chicken, cream, milk, cheese and egg yolks, and foods cooked with fat or vegetable oil. Fruit (except avocado) contain very little amount of fat.⁶

Association between SAFA intake with percentage of body fat in premenopausal women in Padang City

The correlation results of SAFA intake with body fat percentage showed r value = 0.648 and p = 0.000. Based on the bivariate analysis, there was an association between SAFA intake and body fat percentage of premenopausal women. This result was in line with previous research conducted which showed that there was a correlation between fat intake and body fat percentage. Furthermore, another study conducted, showed that SAFA intake also affected body fat in premenopausal women.¹⁸

Results in this study also showed that SAFA intake was higher in premenopausal women in Padang City. SAFA intake affects the percentage of body fat in premenopausal women because SAFA affects cholesterol. Unused fat deposits will increase harmful fat levels in the body. Results of this study showed higher SAFA intake, so SAFA intake of premenopausal women in Padang City had to be reduced. Premenopausal women must reduce the food sources which contains high amount of SAFA such as palm oil, coconut oil, butter, full cream milk and cheese. High SAFA intake can cause obesity.

Association between MUFA intake with percentage of body fat in premenopausal women in Padang City

Results of correlation test between MUFA intake with body fat percentage showed r value = 0.651 and p = 0.000. Based on the bivariate analysis, there was an association between MUFA intake and body fat percentage of premenopausal women. This result was in line with previous studies conducted which showed that there was an association between MUFA intake and body fat percentage.¹⁹ The results of this study indicate that MUFA intake is lower in premenopausal women in Padang City.

MUFA intake affects body fat in premenopausal women because MUFA can reduce body fat. In the results, it was found that the MUFA intake were lacking so that the

MUFA intake in premenopausal women in Padang City had to be increased. So, premenopausal women must increase their intake of food ingredients such as olive oil, peanuts, soybeans, poultry meat, walnuts, peanut butter, and avocados because these foods contain high amount of MUFA. The high intake of MUFA can reduce the risk of coronary heart disease (CHD).

The following are examples of food ingredients that contain high amount of MUFA, which should be consumed more often, namely olive oil, peanuts, soybeans, poultry meat, walnuts, peanut butter, and avocados.²⁰ In addition, some cooking oil companies have modified the fat content by adding MUFA, namely omega-9.

Association between PUFA intake with percentage of body fat in premenopausal women in Padang City

The correlation test results between PUFA intake with body fat showed r value = 0.413 and p = 0.002. Based on the bivariate analysis, there was an association between PUFA intake and body fat percentage of premenopausal women. This result is in line with previous research conducted which showed that there was a correlation between PUFA intake and body fat percentage.²¹ The results of the study showed that PUFA intake was normal in premenopausal women in Padang Padang.

PUFA can be classified in 2 classes, namely omega-3 and omega-6. Food sources that contain high amount of omega-3 are fish, especially marine fish that live in cold or deep waters such as salmon, tuna, sardines and mackerel. Various types of seafood also contain high amount of omega-3. Soybeans are vegetable ingredients that contain omega-3. Food ingredients that contain high amount of omega-6 are vegetable oils, soybeans, corn, grains, nuts, and wheat seeds.²⁰

PUFA affects body fat of premenopausal women, because PUFA can reduce body fat. In the results, it was found that the results of normal PUFA intake, therefore the PUFA intake in premenopausal women must be maintained. The following are examples of sources of food ingredients which contain high amount of PUFA, which must be consumed in appropriate amount, namely various types of seafood, which also contain a lot of omega-3, soybeans, which also contain omega-3. The sources of omega-6 foods, namely vegetable oils, soybeans, corn, grains, nuts, and wheat seeds also contain a high amount of PUFA.

CONCLUSION

The average carbohydrate intake was lower than the nutritional adequacy ratio (NAR) in premenopausal women in Padang City. The average fat intake was higher compared to nutritional adequacy ratio (NAR) in premenopausal women in Padang City. The average SAFA intake was higher than the nutritional adequacy

ratio (NAR) in premenopausal women in Padang City. The average MUFA intake was lower than the nutritional adequacy ratio (NAR) in premenopausal women in Padang City. The average PUFA intake was normal compared with the nutritional adequacy ratio (NAR) in premenopausal women in Padang City. Estradiol levels were normal compared with values in premenopausal women in Padang City. The average fat percentage of was higher than the normal value in premenopausal women in Padang City. There was an association between carbohydrate intake and fat percentage in premenopausal women in Padang City. There was an association between fat intake and fat percentage in premenopausal women in Padang City. There was an association between SAFA intake and fat percentage in premenopausal women in Padang City. There was an association between MUFA intake and fat percentage in premenopausal women in Padang City. There was an association between PUFA intake and fat percentage in premenopausal women in Padang City. There was no association between estradiol levels and fat percentage in premenopausal women in Padang City.

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