PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

OPEN ACCESS Pakistan Journal of Nutrition

ISSN 1680-5194
DOI: 10.3923/pjn.2019.387.390

Research Article
Fat Intake is Associated with Nutritional Status in Minangkabau Adult Women: A Cross-Sectional Study

[1]Desmawati, [1]Delmi Sulastri, [2]Yuniar Lestari, [1]Ulya Uti Fasrini and [3]Afriwardi

[1]Department of Nutrition, Medical Faculty of Andalas University, Padang, West Sumatra, Indonesia
[2]Department of Public Health, Medical Faculty of Andalas University, Padang, West Sumatra, Indonesia
[3]Department of Physiology, Medical Faculty of Andalas University, Padang, West Sumatra, Indonesia

Abstract

Background and Objective: Obesity is a multifactorial disease that has increased in prevalence worldwide. This study aimed to determine the association of macronutrient intake and physical activity levels with nutritional status in Minangkabau adult women. **Materials and Methods:** This was a cross-sectional study that was conducted on 116 Minangkabau women between 40 and 54 years old. Food intake assessment was performed using a food frequency questionnaire (FFQ). Nutritional status was calculated based on body mass index. Statistical analysis was performed using one-way ANOVA and chi-square test and the significance level was set at $p<0.05$. **Results:** This study revealed that most subjects were overweight (30.2%) or obese (38.8%). The average intake was as follows: Total calories 2012.18 $\pm$737.9 kcal day^{-1}, carbohydrate 269.69$\pm$104.3 g day^{-1}, fat 64.51$\pm$27.8 g day^{-1}, protein 86.6$\pm$37.3 g day^{-1} and fiber 13.04$\pm$6.4 g day^{-1}. The statistical analysis showed that there was a significant relationship between fat intake and nutritional status ($p = 0.03$), while there was no significant relationship between the intake of other macronutrient and nutritional status ($p>0.05$). **Conclusion:** There was a significant relationship between fat intake and nutritional status in Minangkabau adult women but no such relationship was observed with other macronutrients.

Key word: Fat intake, macronutrient intake, Minangkabau, nutritional status, obesity

Received: August 16, 2018 Accepted: January 13, 2019 Published: March 15, 2019

Citation: Desmawati, Delmi Sulastri, Yuniar Lestari, Ulya Uti Fasrini and Afriwardi, 2019. Fat intake is associated with nutritional status in minangkabau adult women: a cross-sectional study. Pak. J. Nutr., 18: 387-390.

Corresponding Author: Desmawati, Department of Nutrition, Medical Faculty of Andalas University, Padang West Sumatra, Indonesia Tel: +6285274467797

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Obesity is a multifactorial disease that has increased prevalence worldwide. Obesity is characterized by an excess level of fat, as demonstrated by an increased body fat percentage, exceeding approximately 25% in males and 30% in females[1]. According to WHO data, in 2016 an estimated 15% of adult women in the world were obese. However, in Southeast Asia, only 3-6% of the population is obese[2]. In Indonesia, 32.9% of adult women are obese. In the West Sumatra province, the prevalence of obesity in adult females is lower than the national rate of 21.3%[3]. According to the National Center for Health Statistics (NCHS), globally, the highest incidence of obesity is in adult (18 years and over) and women[3,4].

Obesity occurs because of changes in people's lifestyles, such as high calorie, high fat and high carbohydrate intake; low fiber; and lack of physical activity[1]. Several studies have suggested that macronutrient intake is closely related to nutritional status but this relationship continues be debated. The Minangkabau ethnic group often consumes food from animal sources, coconut milk and spices but consumes fewer vegetables and fruits[5].

Another causes of obesity is the lack of daily and structured physical activity[1,2]. Physical activity is defined as any body movement produced by skeletal muscles that require energy expenditure. Lack of physical activity is an independent risk factor for chronic diseases and is estimated to increase death rates globally[2]. This study aimed to determine the relationship of macronutrient intake with nutritional status in Minangkabau adult women.

MATERIALS AND METHODS

This research used a cross-sectional design with a simple random sampling method to select subjects from Minangkabau women. This research was conducted in Padang from July to December 2017. One hundred and sixteen Minangkabau women between 40 and 55 years old were selected randomly. Individuals were considered Minangkabau if both parents were from Minangkabau tribes. The willingness of respondents to participate was demonstrated by signing an informed consent form. Women who suffered from chronic diseases such as diabetes mellitus, stroke, cardiovascular disease and cancer were excluded from the study. Subjects with severe stress demonstrated by a questionnaire and athletes were also excluded. This study was approved by the Institutional Ethical Committee of the Medical Faculty of Andalas University (Protocol no 279/KEP/FK/2017).

Measurement: Food intake data were obtained by an interview with a trained nutritionist using a semi-quantitative food frequency questionnaire (SQ-FFQ). Measurement of height was carried out using a stature meter and body weight and nutritional status were calculated based on BMI, which was assessed by trained people.

Statistical analysis: Statistical analysis was conducted with SPSS 23 software using descriptive and bivariate analyses (one-way ANOVA) with a significance level of $p<0.05$.

RESULTS AND DISCUSSION

A total of 116 Minangkabau women between 40 and 54 years old were included in this study. Table 1 shows the distribution of the nutritional status of the research subjects. From Table 1, we can observe that most of the subjects were overweight and obese.

Based on the examination of the nutritional status of the subjects, more than half of the subjects were overweight or obese, including cases of central obesity. This result is consistent with those obtained in a previous study by Jalal *et al.*[6], who obtained a rate of central obesity of 48.7% in women. This difference may be due to differences in the age of subjects; Jalal's research was conducted on subjects aged 35 years and above, while this study was conducted on premenopausal women. Another study by Desmawati [7] also found that 35% of respondents were obese and 92% of those subjects had central obesity. This suggests that Minangkabau individuals have a high prevalence of obesity and central obesity.

Table 2 shows that the average age of the subjects was 47.02±3.97 years, the total calorie intake was 2012.18±737.99 kcal day^{-1}, the carbohydrate intake was 269.68±104.29 g day^{-1}, the fat intake was 64.51±27.85 g day^{-1} and the protein intake was 86.62±37.33 g day^{-1}. Subjects also had low fiber intake (13.04±6.39 mg day^{-1}).

Table 3 demonstrates that the average intake of carbohydrates and protein was in the recommended range but the subjects had a higher fat intake than the recommended intake. Obesity was caused by excessive dietary

Table 1: Distribution of nutritional statuses of subjects (n=116)

Variable	No.	Percentage
Nutritional status		
Underweight	5	4.3
Normal	31	26.7
Overweight	35	30.2
Obese	45	38.8
Total	116	100.0

Table 2: Mean age and food intake of study subjects (n = 116)

Variables	Mean	Standard deviation	Min-Max
Age (years)	47.02	3.97	40-54
Total calorie intake (kcal day^{-1})	2012.18	737.99	682.46-5560.93
Carbohydrate intake (g day^{-1})	269.68	104.29	83.2-759.24
Fat intake (g day^{-1})	64.51	27.85	22.35-199.95
Protein intake (g day^{-1})	86.62	37.33	21.28-238.21
Fiber intake (mg day^{-1})	13.04	6.39	2.27-37.99

Table 3: Nutrient intake of the subjects based on the RDA

Variables	Mean±SD	Range	RDA* (%)
Energy (kcal)	1935.00±629.67	682.46-4043.51	
Calories from fat (%)	28.48±5.18	15.96-42.74	20-25
Calories from carbohydrate (%)	53.98±7.14	36.42-73.07	50-60
Calories from protein (%)	17.20±3.61	10.32-30.73	15-20

* Recommended daily allowance

Table 4. Relationship between food intake and nutritional status

Intakes	Underweight	Normal weight	Overweight	Obese	p-value
Total calories	2598.33	1885.58	1982.77	2057.15	0.233
Carbohydrate intake	317.11	256.96	261.62	279.46	0.558
Fat intake	96.82	58.15	62.56	66.81	0.030*
Protein intake	115.35	82.64	89.93	83.60	0.276
Fiber intake	14.30	11.30	12.20	14.76	0.094

intake and a lack of physical activity. In this study, it was found that the average total caloric intake of the subjects was 1935.00±629.67 kcal but the intake range was very large, ranging from 682.46-4043.51 kcal. This illustrates that the calorie intake of the subjects varied widely. Some subjects had a low caloric intake and some subjects had a high calorie intake; the intake of some subjects was almost twice that recommended by the Nutrition Adequacy Rate of Indonesia. Similarly, the intake of carbohydrates, fats and proteins varied widely. The average fat intake in subjects was more than the recommended amount. The percentage of fat intake was 28.48% of total calories, while the recommended amount is 20-25%. This result is in line with the result of a study by Sulastri *et al.*[8], who stated that Minangkabau people have a high fat intake with an average of 25% of total calories. Differences in these results may be due to differences in subject characteristics; the study by Sulastri *et al.*[8] have been conducted in the general population in both genders, whereas the current study was limited to premenopausal women.

The average fiber intake in this study was 12.73 g per day. This result is lower than the recommended amount of 25 mg per day. However, this result is higher than the results obtained by Sulastri *et al.*[8], who observed a fiber intake in Minangkabau individuals of only 7.4 mg per day. This difference may be due to differences in research subjects, where the subjects in previous studies were men and women of different age ranges, whereas in this study, subjects were women aged 40- 54 years old. Fiber consumption is almost uniform for the entire population in Indonesia. Approximately 93.6% of the population over 10 years old consumed less fiber.[3] Fiber consumption is related to general health and immunity. Research conducted on 509 students in the Netherlands stated that high fiber consumption was related to the degree of health and immunity only in men but not in women. This may be due to differences in dietary habits in both genders[9]. In this study all subjects were female, so differences in habits were not found. Other studies also stated that fiber consumption was associated with cardiovascular disease, type 2 diabetes mellitus, cancer, weight, digestive health and mineral bioavailability[10].

The results of the statistical analysis with a one-way ANOVA test are shown in Table 4. Statistical analysis showed that there was a significant relationship between fat intake and nutritional status ($p = 0.03$), while there was no significant relationship between the intake of other macronutrients and nutritional status ($p>0.05$).

The results of the statistical analysis showed that there was a significant correlation between fat intake and nutritional status in adult females ($p = 0.03$), whereas total energy, carbohydrate, protein and fiber intake demonstrated no significant relationship with the nutritional status of the subjects. These results differ from those of Ulum and Bahar[11] who observed a significant relationship between the intake of all macronutrient (fats, carbohydrates, proteins and fiber) and obesity in people aged 40-55 years. Similarly, Reis's Brazilian

study revealed a significant association between carbohydrate intake and obesity[12]. Another study by Ahmed and Siwar[13] in Malaysia also found the same result that we did in this study. In that study, fat intake was also closely related to nutritional status among adults in Malaysia.

It is unfortunate that this research did not include the physical activity and nutritional status of the subjects since their childhood. The genetic history and nutritional status of the families (especially fathers and mothers) of the subjects were not investigated. More research is needed on this issue, especially for Minangkabau women, to prevent the development of health problems related to obesity.

CONCLUSION

There is a significant relationship between fat intake and nutritional status in Minangkabau adult women.

SIGNIFICANCE STATEMENT

This study discovered the possible relationship between fat intake and nutritional status in Minangkabau adult women, which can be beneficial for planning diets to lose body weight. This study will help the researcher plan a diet that is suitable for maintaining nutritional status especially for women. Thus a new theory of good eating patterns specific to Minangkabau women might be developed.

ACKNOWLEDGMENT

We acknowledge the medical faculty of the Andalas University, Indonesia for providing the 'Fundamental Funding'.

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