Scientific Research Publishing

Food and Nutrition Sciences, 2022, 13, 349-357
https://www.scirp.org/journal/fns
ISSN Online: 2157-9458
ISSN Print: 2157-944X

Foods Intakes and Their Influences on BMI (Body Mass Index) in Young and Middle Aged Women in Japan

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How to cite this paper: Takada, A., Shimizu, F., Ishii, Y., Ogawa, M. and Takao, T. (2022) Foods Intakes and Their Influences on BMI (Body Mass Index) in Young and Middle Aged Women in Japan. *Food and Nutrition Sciences*, **13**, 349-357.
https://doi.org/10.4236/fns.2022.134026

Received: March 17, 2022
Accepted: April 16, 2022
Published: April 19, 2022

Abstract

Background: Japanese women's body mass index (BMI) was known to be the lowest among people in OECD countries. We wanted to compare foods intakes and relationships between intakes of particular food species and BMI. Methods: We asked young and middle-aged women to participate and used a brief-type self-administered diet history questionnaire (BDHQ) to know the amounts of various food species they took. Results: Weights and BMI of young and middle-aged women were not different. Middle-aged women took almost all species of foods and energy more than young women. Except for cholesterol of soluble dietary fibers, there was no correlation between foods intakes and BMI. Conclusion: Both young and middle-aged Japanese women are lean (BMI; around 22). Middle-aged women took more energy, and proteins, carbohydrates, and lipids compared with young women. Middle-aged women spend more energy on house workings than young women in Japan.

Keywords

Body Mass Index, BDHQ, Protein, Carbohydrate, Lipid, Cardiovascular Disease, Diabetes Mellitus, Obesity, Overweight

1. Introduction

In 2000, the World Health Organization declared obesity as a pandemic and issued a global action plan to combat the rise in obesity 12 years later [1] [2]. An increase in the population of overweight and the inefficacy to control body weight are considered to cause the rising disease burden and mortality from cardiovascular diseases, cancer, and diabetes.

Although people in poor countries carry a disproportionate share of the health burden overweight and obesity do not show a consistent wealth gradient across different levels of economic development. As national economic development is increasing, the burden of overweight and obesity shifts to populations with lower personal wealth [3] [4] [5].

It has been shown that as countries develop economically, overweight prevalence increased substantially among the poorest and stayed mostly unchanged among the wealthiest [6].

Japan is one of the most affluent countries in the world, but the BMI of Japanese men and women is at the lowest in OECD countries [7].

Obesity is considered to be caused when the energy input is higher than the output. Also, insulin causes obesity since insulin increase fat by converting glucose to fat.

Previously we reported foods intakes and body mass index (BMI) of old or young men and women in Japan [8] [9] [10] [11] [12]. In the present paper, we report foods intakes and its relationships with BMI in young and middle-aged women in Japan.

2. Methods

We asked female students of Show Women's University and female acquaintances older than 50 years old. Acquaintances mean that these participants are personal friends of our group members. The sample sizes and ages of participants are as follows. Acquaintances are older than 50 years old women (n = 20, age; 64.3 ± 8.5). Students are at 20.3 ± 0.8 years old (n = 26) Doctors checked their health carefully and examined their blood samples then recruited them if there were no health problems such as diabetes, hypertension, or not serious diseases experienced in the past. They did not smoke in the past. We also excluded people who took drugs for dyslipidemia, hyperglycemia, or hypertension. We collected blood samples early morning. Healthy participants were given self-administered diet history questionnaires and described answers on each item by the recollection of diets they took (7 days dietary recall). We used a brief-type self-administered diet history questionnaire (BDHQ) by using the Japanese Ministry of Health, Labour and Welfare report National Nutrition Surveys. From these questionnaires, we calculated the intakes of energy, carbohydrate, fat, protein, or other foods.

2.1. Ethics

This work has been approved by the Ethical committees of Showa Women's University and has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments.

2.2. Statistics

The results are presented as means ± SEM. Statistical significance of the differ-

ences between groups was calculated according to one-way ANOVA. When ANOVA indicated a significant difference ($p < 0.05$), the mean values were compared using Tukey's least significant difference test at $p < 0.05$. Spearman's correlation tests were used to examine statistical significance.

3. Results

Table 1 shows the backgrounds of the participants. BMI or weight is not different between young and middle-aged women.

Table 2 shows energy and foods intakes of young and middle-aged women. Intakes of almost all foods are significantly higher in middle-aged women than in young women.

Table 3 shows that middle-aged women take more sugar and beans than young women.

Table 4 shows that except for cholesterol of soluble dietary fibers, there was not a correlation between foods intakes and BMI.

4. Discussion

It is well recognized that obesity or overweight is a big risk factor for non-communicable diseases such as cardiovascular diseases (CVD), type 2 diabetes mellitus (T2DM), or cancer.

The rising prevalence of overweight and obesity in a number of countries [13] [14] [15] [16] [17] has been described as a global pandemic [18] [19] [20]. In 2010, overweight and obesity already were estimated to cause 3.4 million deaths, 3.9% of years of life lost, and 3.8% of disability-adjusted life years (DALYs) globally [21]. Studies in the USA have suggested that the rise in obesity could lead to future declines in life expectancy [22]. Concern about the health risks associated with rising obesity has become nearly universal; the Member States of the World Health Organization adopted a voluntary target of halting the rise in obesity by 2025 [23]. There have been widespread calls for regular monitoring of changes in overweight and obesity prevalence in all populations [24] [25] [26] [27].

When countries are poor, only the wealthiest people can eat enough food, thus suffering from obesity-related diseases, but in the countries wealthier these disease patterns change.

Table 1. Backgrounds of participants.

	middle aged	young
	(n = 20)	(n = 26)
age	64.3 ± 8.5	20.3 ± 0.8**
height (cm)	157.0 ± 7.0	159.2 ± 5.3
weight (kg)	50.4 ± 6.9	52.2 ± 6.7
BMI (kg/m^2)	20.4 ± 2.6	20.6 ± 2.6

**: $p < 0.01$.

Table 2. Foods intakes.

	middle aged	young
	(n = 20)	(n = 26)
energy (kcal/day)	2034 ± 596	1540 ± 426**
protein (g/day)	80.1 ± 28.3	57.9 ± 16.7**
animal protein (g/day)	46.2 ± 20.1	33.5 ± 13.1*
vegetable protein (g/day)	33.8 ± 10.9	24.4 ± 8.3**
lipids (g/day)	64.2 ± 22.1	52.4 ± 16.8*
animal lipids (g/day)	30.6 ± 11.8	23.0 ± 9.1*
vegetable lipids (g/day)	33.6 ± 12.0	29.3 ± 9.5
carbohydrates (g/day)	260.7 ± 85.3	198.4 ± 76.5*
sodium (mg/day)	4481.7 ± 1287.2	3329 ± 873**
potasium (mg/day)	3164.8 ± 1161.3	2105 ± 758**
calcium (mg/day)	663 ± 299	430 ± 164**
magnesium (mg/day)	299 ± 109	198 ± 62**
phosphorus (mg/day)	1228 ± 456	857 ± 252**
iron (mg/day)	9.3 ± 3.3	6.7 ± 2.0**
zinc (mg/day)	9.3 ± 2.9	6.9 ± 2.0**
cupper (mg/day)	1.29 ± 0.43	0.94 ± 0.31**
manganese (mg/day)	3.58 ± 1.15	2.34 ± 0.83**
retinol (μg/day)	426 ± 288	274 ± 149*
β carotene (μg/day)	4520 ± 2385	3525 ± 2025
Vit D (μg/day)	14.8 ± 10.0	10.1 ± 6.4
α tocophenol (mg/day)	8.8 ± 3.35	7.0 ± 2.3*
Vit B^1 (mg/day)	0.98 ± 0.31	0.69 ± 0.21**
Vit B^2 (mg/day)	1.56 ± 0.62	1.03 ± 0.32**
folic acid (μg/day)	403 ± 151	283 ± 107**
Vit C (mg/day)	155 ± 61	97 ± 45**
saturated fatty acids (g/day)	17.7 ± 6.3	14.2 ± 5.6
monosaturated fatty acids (g/day)	22.7 ± 7.7	19.1 ± 6.4
polysaturated fatty acids (g/day)	15.1 ± 5.4	12.4 ± 3.8
cholesterol (mg/day)	426.8 ± 200.3	368.6 ± 148.5
soluble dietary fiber (g/day)	3.9 ± 1.3	2.8 ± 1.1**
insoluble dietary fiber (g/day)	10.5 ± 3.4	7.4 ± 2.7**
total dietary fiber (g/day)	14.7 ± 4.9	10.7 ± 3.9**
salt (g/day)	11.3 ± 3.3	8.4 ± 2.2**

*: $p < 0.05$, **: $p < 0.01$.

Table 3. Intakes of each food category in middle aged an young women.

each food category	middle aged	young
	(n = 20)	(n = 26)
cereals (g/day)	372.4 ± 184.5	294.4 ± 191.6
potetoes (g/day)	53.4 ± 36.0	52.7 ± 42.8
sugars(g/day)	5.1 ± 3.5	2.8 ± 1.4**
beans (g/day)	85.0 ± 60.2	53.6 ± 32.5*
green vegetables (g/day)	126.9 ± 69.0	98.3 ± 53.5
other vegetables (g/day)	207.6 ± 87.0	166.3 ± 73.2
fruits (g/day)	194.0 ± 108.8	81.7 ± 59.0**
fish (g/day)	82.2 ± 54.4	56.7 ± 38.7
meats (g/day)	90.1 ± 32.7	71.8 ± 34.6
eggs (g/day)	42.5 ± 31.1	39.4 ± 24.8
milk (g/day)	189.6 ± 117.9	86.5 ± 67.7**
lipids (g/day)	11.3 ± 5.8	11.5 ± 5.5
cookies (g/day)	68.3 ± 46.8	61.4 ± 44.5
favorite beverages (g/day)	787.0 ± 504.3	281.9 ± 205.1**
seasonings (g/day)	252.3 ± 158.2	176.2 ± 166.2

*: $p < 0.05$, **: $p < 0.01$.

Table 4. Correlations between various foods intakes and BMI.

BMI vs foods intakes correlation	middle aged	young
	(n = 20)	(n = 26)
BMI vs		
energy (kcal/day)	−0.045	−0.282
protein (g/day)	−0.038	−0.273
animal protein (g/day)	−0.068	−0.110
vegetable protein (g/day)	0.026	−0.372
lipids (g/day)	0.082	−0.265
animal lipids (g/day)	−0.015	−0.108
vegetable lipids (g/day)	0.164	−0.365
carbohydrates (g/day)	−0.128	−0.248
saturated fatty acids (g/day)	0.110	−0.240
monosaturated fatty acids (g/day)	0.103	−0.218
polysaturated fatty acids (g/day)	0.083	−0.310
cholesterol (mg/day)	−0.218	0.066*
soluble dietary fiber (g/day)	−0.163	−0.394*

Continued

insoluble dietary fiber (g/day)	−0.061	−0.433*
total dietary fiber (g/day)	−0.112	−0.428
salt (g/day)	−0.034	−0.255
n − 3 fatty acid (g/day)	0.019	−0.274
n − 6 fatty acid (g/day)	0.103	−0.309
Pearson correlation coefficients		

*: $p < 0.05$, **: $p < 0.01$.

These non-communicable diseases are on the rise in low-income countries because of the increased prevalence of taking unhealthy diets and cigarette smoking. At the same time, population aging and growth are increasing the speed of the shift from communicable, maternal, neonatal, and nutritional diseases to non-communicable diseases [28] [29] [30].

In the present study, we found that the BMI of young and middle-aged women is the same, but energy intake or other foods intakes such as protein, lipid, or carbohydrates are higher in middle-aged women compared to young women.

We speculate that in Japan older women take care of house workings such as cocking, cleaning, or daily shopping for family members so middle-aged women may use more energy than young women.

As to BMI and health, it has been shown that obesity was associated with shorter longevity and a significantly increased risk of cardiovascular morbidity and mortality compared with normal BMI [31].

Also, it is shown that compared with normal-weight individuals, men and women with obesity lived 4.1 fewer years free of CVD; however, they lived 3.9 longer years with CVD than their normal-weight counterparts, respectively [31]. BMI of Japanese women is at the lower levels of its normal value.

Our data are somewhat intriguing. Probably, in Japan, middle-aged women work harder than young women in house workings. Thus energy expenditure was being higher in middle-aged women compared with young women.

Another observation is that BMI was not influenced by the kind of foods they took.

Acknowledgements

We appreciate the participation of middle-aged women and students of Showa Women's University in the present works.

Conflicts of Interest

No author had conflicts of interest in the present works.

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