

A Study of the Effects of Dietary Behavior on the Nutritional Status of University Students

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ABSTRACT

The purpose of this study was to investigate the effects of dietary behavior on the nutritional status of university students in Korea. A dietary intake survey of 603 university students (223 males and 380 females) was conducted using a 24-hour recall method. The resulting data on dietary behavior and nutrient intakes were analyzed by the SAS program package. The main results were as follows: 1) Most of the subjects were in their twenties and no obese cases were found. 2) Dietary intake data showed that, except for vitamin C in the female students, the average daily intakes of most nutrients did not meet the Korean Recommended Dietary Allowances (RDA). The study also showed that most of the subjects, especially the female students, were concerned about having satisfactory physical appearances. Fat provided 25% of the daily energy intake, and this level was higher than the 20% recommended by the Korean Dietary Guidelines. In the female students, the iron intake from animal foods was lower than that from plant foods. 3) Male students were not very serious about healthy eating. However, the female group, who obtained a high score in dietary behavior, consumed more vegetables and had higher intakes of energy, protein, Ca, P, vitamin A, and vitamin C than the male group, even though they did not meet the Korean RDA in most nutrients. Energy intake from fats, as a percent of total energy intake, was lower than in the group of females who obtained higher scores in dietary behavior than the other groups. To sum up, the university students surveyed in this study were found to have the typical dietary behavior of young adults, such as frequent eating out and snacking. Female students were extremely conscious of their body images; this can exert an important direct influence on their dietary intakes and health status. It is very important for university students to develop healthy lifestyles and desirable dietary behaviors, to best enable them to continue to lead a healthy life in their later years.

KEY WORDS: dietary behavior, dietary intake.

INTRODUCTION

It has been reported that degenerative diseases such as diabetes, hypertension and arteriosclerosis are increasing recently in Korea as well as in the United States and Europe.¹⁾ It is supposed that one's dietary pattern influences one's health status. Since many nutrition factors contribute to the increased risk of chronic diseases, recent changes in diet and lifestyle have been repeatedly suggested to be important causes of the recent increases in major chronic diseases among Koreans.²⁾

Dietary habits are important determinants of one's diet and nutritional status.³⁾ Dietary habits are concerned with what to eat, why to eat, when to eat and how to eat.⁴⁾ Dietary habits of each individual tend to persist throughout life. It is very difficult to correct one's dietary habit in a short period of time; such corrections become more difficult to implement in adults than in children, and the twenties can be seen as the last chance to make cor-

rections before it becomes too late.⁵⁾⁶⁾

In Korea, the children in high schools mostly devote their time to studies and their way of life is relatively disciplined and systematic. But once young adults enter university, their lifestyles make a sudden change, with more free time, and more interest in the outside world and in extracurricular activities. On the other hand, university students may have little time to think about eating on a limited budget. The first research on household food consumption was carried out in Korea in 1957, and much research has since been conducted on the food preferences, dietary behaviors, and nutritional status of university students.⁷⁾¹⁴⁾ Students tend to incur diet imbalances due to eating instant food, snacking frequently, and drinking lots of alcohol.¹⁵⁾¹⁶⁾

University students in general have been found not to recognize the importance of proper nutrient intakes, and female students in particular show inadequate intakes of energy and essential nutrients such as calcium and iron, due to dieting.¹⁷⁾ Because of social pressures and also of incorrect notions of health, female students have a strong consciousness of their physical appearances, and they of-

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ten fall in the trap of attempting weight control through such behaviors as skipping meals, doing compulsive exercise, and developing eating disorders.⁸⁾¹⁸⁻²⁰⁾

According to a dietary survey of the students in the Daegu area, it has been found that male students have become more conscious of their body images than before (similar to female students) because they acquire lots of nutrition- and health-related information through the media such as television, radio, newspapers, magazines and the internet.²¹⁾ In order to encourage the adult population, including university students, to consume proper amounts of nutrients from their diets, nutrition education is needed to enhance their understanding of nutrition.²²⁾²³⁾

It is important for university students to develop healthy lifestyles and desirable dietary behavior in order to prevent degenerative diseases in later life. Unfortunately, many university students in Korea lack adequate knowledge regarding nutrition and nutritious foods, and their diets often fail to meet current dietary recommendations. Therefore, the aim of this study was to investigate the effect of dietary behavior on the nutritional status of university students in order to better design future nutrition education programs for this group of adults.

SUBJECTS AND METHODS

1. Subjects and study period

The subjects were 603 university students (223 males and 380 females) attending food- and nutrition-related classes at Kookmin, Hanyang, Sangmyong, Seoul National and Ewha Woman's Universities. Self-administered questionnaires were collected from the students during the period April/May, 2001.

2. Questionnaire

The questionnaire requested information on demographic characteristics, health-related lifestyle, dietary intakes, and dietary behaviors.

1) Dietary record

A 24-hr recall method was used for dietary intake. Nutrient intakes were analyzed by using a computer-aided nutritional program for professionals (CAN-Pro, Korean Nutrition Society, 1997), and the results were compared with the Korean Recommended Dietary Allowances (RDA) as published by the Korean Nutrition Society, 7th revision, 2000.

2) Anthropometric measurements

The heights and weights were measured for both male and female subjects. The BMI (body mass index) was calculated by taking body weight in kilograms divided by height in meters squared.

3) Dietary behaviors

Dietary behaviors included 13 items related to meal regularity, meal balance, self-recognition of food habits, and skipping meals. The practices of eating out and snacking was studied by their frequency, timing, reasons given, and places of eating. Dietary behavior scores were calculated on the basis of the methods previously used by Kim YK *et al.*, and others.²⁴⁻²⁶⁾ Then, the subjects were divided into three groups by dietary behavior scores (low, average, and high scores), and the levels of nutrient intakes were compared among the three groups.

3. Statistical analysis

The statistical analysis was conducted using the SAS (Statistical Analysis System) software. Frequency counts (%), means, and standard deviations were calculated for all variables. A GLM (Generalized Linear Model) was used to determine statistical significance. Turkey's student t-test was used to compare the values among the three groups.

RESULTS

1. Anthropometrics

The general characteristics of the subjects are shown in Table 1. Average ages of the male and the female students were 22.5 and 20.8 years, respectively. The mean height, body weight and BMI of the male students were 174.6 cm, 67.7 kg, 22.2 and those of the female students were 162.4 cm, 51.7 kg, and 19.7, respectively. These anthropometric measurements were within the standard range for Korean adults. The anthropometric mean level between male and female was statistically significant ($p < 0.001$).

Table 1. Physical characteristics of the subjects

	Man	Woman
Age (year)	22.5 ± 2.7 ¹⁾	20.8 ± 4.4
Height (cm)	174.6 ± 5.0*** ³⁾	162.4 ± 4.6
Weight (kg)	67.7 ± 8.8***	51.7 ± 6.1
BMI (kg/m ²) ²⁾	22.2 ± 2.2***	19.7 ± 1.9

1) Mean ± SD

2) Body mass index = weight (kg)/height (m)²

3) ***p < 0.001

2. Dietary intakes

Daily dietary intakes of energy and other nutrients are presented in Table 2. Nutrient intake was expressed as a

percentage of the Korean RDA.²⁷⁾

The average daily total energy intake of all study subjects was 1747.8 kcal, which is below the mean energy in-

Table 2. Daily mean nutrient intakes and RDA % of the subjects

Nutrient	Man		Woman	
	Intake	RDA (%)	Intake	RDA (%)
Energy (kcal)	2075.4 ± 420.1 ^{1)***}	83 ^{***2)}	1557.1 ± 508.5	66
Protein (g)	78.4 ± 19.8 ^{***}	112 ^{***}	54.8 ± 20.1	82
Fat (g)	59.6 ± 20.2 ^{***}	-	44.6 ± 19.4	-
Carbohydrate (g)	299.4 ± 66.1 ^{***}	-	232.2 ± 79.6	-
Fiber (g)	5.6 ± 2.7 ^{***}	-	4.2 ± 2.1	-
Ca (mg)	479.3 ± 210.2 ^{**}	69 ^{**}	422.9 ± 247	60
P (mg)	1103.3 ± 277.2 ^{***}	158 ^{***}	844.9 ± 315.2	121
Fe (mg)	11.7 ± 4.7 ^{***}	97 ^{***}	9.2 ± 6.9	70
Vitamin A (mg)	789.9 ± 555.9 ^{***}	113 ^{***}	635.6 ± 534.6	91
Vitamin B ₁ (mg)	1.4 ± 0.5 ^{***}	107 ^{***}	1.0 ± 0.4	79
Vitamin B ₂ (mg)	1.2 ± 0.5 ^{**}	82 [*]	1.0 ± 1.2	71
Niacin (mgNE)	17.1 ± 6.2 ^{***}	101 ^{***}	11.8 ± 5.3	73
Vitamin C (mg)	87.2 ± 62.4	125	87.8 ± 78.5	126
Cholesterol (mg)	305.8 ± 168.8 ^{***}	-	227.4 ± 180.8	-

1) Mean ± S.D. 2) *p < 0.05, **p < 0.01, ***p < 0.001

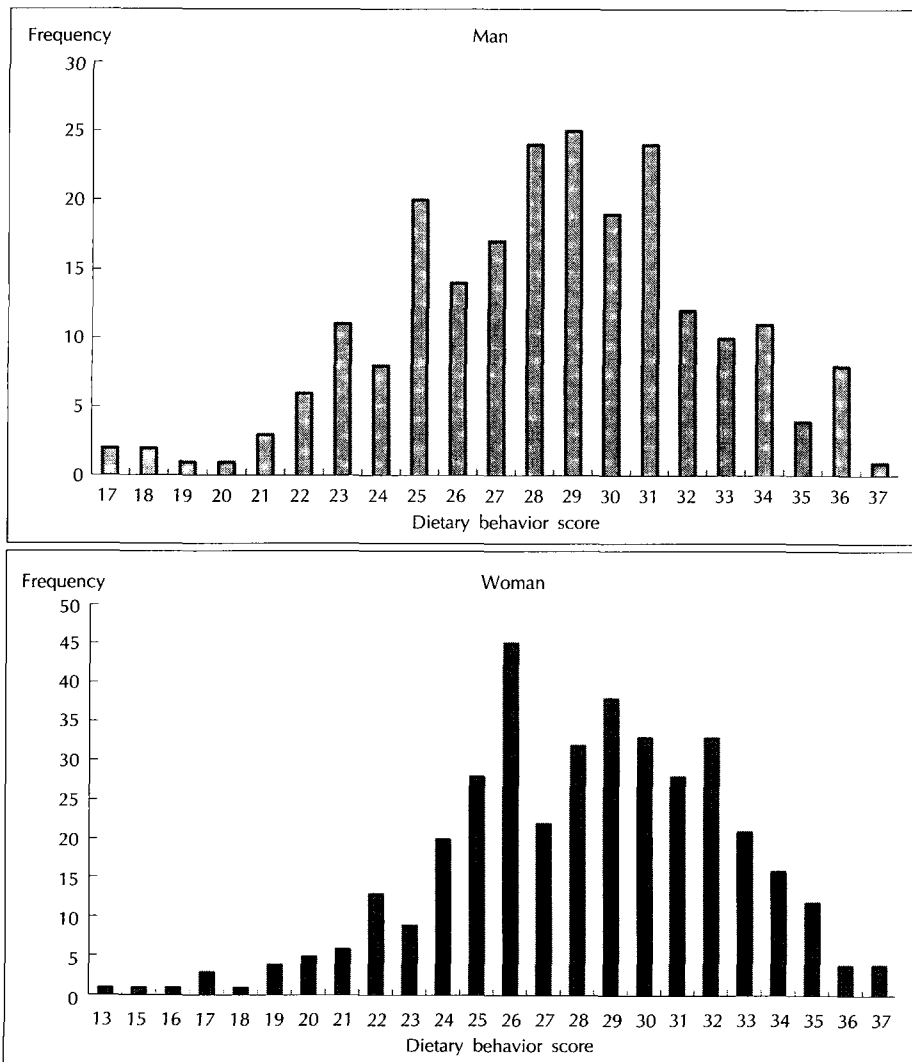


Fig. 1. Distribution chart by dietary behavior score.

take value (1985.4 kcal) among Korean adults.³⁴⁾ The average energy intake was 2075.4 kcal for the male students, and 1557.1 kcal for the female students ($p < 0.001$). The mean of daily total protein intake of all study subjects was 63.5 g, which was less than the mean protein intake (74.2 g) among Korean adults.²⁷⁾ The mean value of protein intake in the males (78.4 g) was significantly higher than that of the females (54.8 g) ($p < 0.001$). The mean daily fat intake of all subjects was 50.1 g, which was higher than the mean intakes among Korean adults (41.5 g).³⁴⁾ The mean fat intake in the males (59.6 g) was significantly higher than that of the females (44.6 g) ($p < 0.001$). The mean value of daily cholesterol intake in the males (305 mg) was significantly higher than that of the females (227.4 mg) ($p < 0.001$).

The average amount of calcium intake in the males was significantly higher than that of the females ($p < 0.01$), and the mean value of iron intakes in the males was also significantly higher than that of the females ($p < 0.001$). Except for vitamin C, vitamin intakes of the male students were significantly higher than that of the female students.

Energy intake was 83% of the Korean RDA in the males, and 66% of the RDA in the females. Both levels therefore did not meet the RDA. The male students consumed 112% of RDA protein, but the female students did not report sufficient intakes of protein (82% of RDA protein). The average intake of phosphorus was adequate for both the male and the female students. The daily calcium intake in both males and females was 60–70% of the RDA. The average calcium intake of the female students was lower than that of male students. The intakes of iron in the male and the female students were 97% and 79% of the RDA, respectively. The male students showed sufficient intakes of vitamins except for vitamin B

Table 3. Average dietary behavior score in the three groups (LG, NG, HG)

	Man		Woman	
	Frequency	Average	Frequency	Average
Low group	54 (24.2) ¹⁾	23.1 ± 2.2 ²⁾	92 (24.2)	22.7 ± 2.6
Normal	99 (44.4)	28.2 ± 1.3	170 (44.7)	28.0 ± 1.5
High group	70 (31.4)	32.9 ± 2.0	118 (31.1)	32.8 ± 1.6

1) N (%), column percent, 2) Mean ± S.D.

Table 4. BMI distribution and number (%) of the three groups

BMI	LG ¹⁾	NG ²⁾	HG ³⁾	Total	χ^2
BMI < 18.5	41 (28.1) ⁴⁾	76 (28.2)	61 (32.5)	178 (29.5)	5.161
18.5 ≤ BMI < 25	95 (65.1)	181 (67.3)	123 (65.4)	399 (66.2)	
25 ≤ BMI < 30	10 (6.9)	12 (4.5)	4 (2.1)	26 (4.3)	
Average	20.9 ± 2.7 ⁵⁾	20.5 ± 2.5	20.3 ± 2.2		

1) Low score group, 2) Normal score group, 3) High score group, 4) column percent, 5) Mean ± S.D.

2, while the female students showed sufficient intakes only of vitamin C. The present survey reported a slightly lower intake levels of most vitamins and minerals, compared to Song's survey data.²⁸⁾

3. Dietary behavior

1) Dietary behavior score and BMI

Dietary behavior scores ranged from 17 to 37 for the male students, and from 13 to 37 for the female students, as shown in Fig. 1. The subjects were divided into three groups by their dietary behavior scores. Table 3 shows that the average scores of the low, normal, and high score groups were 23.1, 28.2, 32.9, respectively, in the males, and 22.7, 28.0 and 32.8, respectively in the females.

Table 4 shows the BMI distribution of the three groups. Although all BMI data were within the normal range independent of the dietary behavior scores, the rate of overweight was the lowest in the high score group.

2) Food intakes of the three groups by dietary behavior scores

Table 5 shows food intakes of the three groups by dietary behavior scores.

All three groups had similar mean levels of intakes for most nutrients, although the high score group in the females had more plant foods, such as cereals, bean curd, vegetables and seaweeds, and had more animal foods such as eggs and fish. The high scoring female students consumed more vegetables than the others, and consumed the least amount of meat and drinks. Therefore, this data shows that the high score group, with good dietary behaviors, had a tendency to take healthier foods.

3) Nutrient intakes of the three groups by dietary behavior scores

Nutrient intakes of the three dietary behavior score groups are presented in Tables 6 and 7.

The high score group in the males had more energy and carbohydrate intake, and in the females more energy, carbohydrate, fat and protein intake. The high score

Table 5. Daily mean values of food intakes in the three groups

	Man			Woman		
	LG ¹⁾ (N = 54)	NG ²⁾ (N = 99)	HG ³⁾ (N = 70)	LG ¹⁾ (N = 92)	NG ²⁾ (N = 170)	HG ³⁾ (N = 118)
Cereals	349.5 ± 122.0 ^{a)}	359.5 ± 107.4	373.4 ± 100.5	253.2 ± 103.7	256.3 ± 109.7	288.3 ± 143.0
Legumes	16.4 ± 28.7	30.6 ± 58.1	21.5 ± 32.6	15.0 ± 26.5	18.3 ± 35.7	21.7 ± 32.3
Vegetables	280.1 ± 171.6	279.6 ± 123.8	285.4 ± 116.2	147.8 ± 97.6 ^{b5)}	183.1 ± 115.3 ^{a)}	213.8 ± 131.6 ^{a)}
Sea weed	2.7 ± 5.8	3.2 ± 9.0	1.7 ± 2.5	2.1 ± 7.2	2.6 ± 9.6	3.8 ± 9.6
Meats	106.1 ± 76.4	95.6 ± 67.4	101.8 ± 73.4	50.7 ± 51.6	52.8 ± 49.9	49.6 ± 36.6
Eggs	34.1 ± 34.8	43.2 ± 38.2	35.9 ± 36.0	26.9 ± 27.7	27.4 ± 28.9	35.9 ± 45.4
Fishes	59.6 ± 72.5	46.8 ± 49.2	53.2 ± 63.4	32.5 ± 44.4	32.3 ± 37.6	45.0 ± 47.1
Daily product	120.6 ± 132.8	108.6 ± 151.1	126.8 ± 169.0	122.3 ± 137.2	141.2 ± 168.6	120.3 ± 128.6
Drinks	200.5 ± 311.1	169.1 ± 303.6	192.3 ± 298.1	166.8 ± 232.6	174.5 ± 281.2	131.4 ± 205.5

1) Low score group, 2) Normal score group, 3) High score group, 4) Mean ± S.D.

5) a b: Values with different superscripts are significantly different at $\alpha = 0.05$ level by Tukey's studentized range test.**Table 6.** Daily mean values of energy nutrient intakes in the three group

	Man			Woman		
	LG ¹⁾ (N = 54)	NG ²⁾ (N = 99)	HG ³⁾ (N = 70)	LG ¹⁾ (N = 92)	NG ²⁾ (N = 170)	HG ³⁾ (N = 118)
Energy (kcal)	2041.0 ± 466.9 ⁴⁾	2057.0 ± 391.9	2139.9 ± 405.0	1464.1 ± 431.8 ^{b)}	1539.8 ± 426.6 ^{ab)}	1668.1 ± 644.6 ^{a)}
Protein (g)	79.7 ± 22.9	77.0 ± 19.3	79.1 ± 16.9	50.2 ± 16.8 ^{b)}	54.2 ± 19.0 ^{ab)}	59.8 ± 23.2 ^{a)}
Fat (g)	61.1 ± 25.4	58.3 ± 17.3	59.7 ± 17.9	43.2 ± 17.3	44.8 ± 19.2	45.6 ± 21.3
Carbohydrate (g)	291.1 ± 66.6	297.5 ± 65.3	311.3 ± 65.9	217.9 ± 71.9 ^{b)}	226.0 ± 58.8 ^{b)}	254.2 ± 103.8 ^{a)}

1) Low score group, 2) Normal score group, 3) High score group, 4) mean ± S.D.

a b: Values with different superscripts are significantly different at $\alpha = 0.05$ level by Tukey's studentized range test.**Table 7.** Daily mean values of vitamin and mineral intakes in the three groups

	Man			Woman		
	LG ¹⁾ (N = 54)	NG ²⁾ (N = 99)	HG ³⁾ (N = 70)	LG ¹⁾ (N = 92)	NG ²⁾ (N = 170)	HG ³⁾ (N = 118)
Fiber (g)	5.5 ± 3.0 ⁴⁾	5.6 ± 2.5	5.6 ± 2.5	3.5 ± 1.7 ^{b5)}	4.2 ± 2.3 ^{a)}	4.6 ± 2.2 ^{a)}
Ca (mg)	482.5 ± 213.4	471.6 ± 214.5	486.8 ± 203.3	373.4 ± 192.5 ^{b)}	430.9 ± 276.9 ^{ab)}	458.4 ± 243.3 ^{a)}
P (mg)	1108.1 ± 294.0	1087.5 ± 278.4	1121.2 ± 259.0	766.9 ± 259.7 ^{b)}	846.0 ± 289.2 ^{ab)}	916.6 ± 376.5 ^{a)}
Fe (mg)	11.4 ± 4.1	11.6 ± 4.8	12.0 ± 5.4	9.0 ± 9.0	9.0 ± 6.4	9.5 ± 5.0
Vitamin A (mg)	847.7 ± 835.8	755.7 ± 383.5	776.3 ± 349.1	521.1 ± 277.3 ^{b)}	653.1 ± 590.7 ^{ab)}	718.9 ± 616.3 ^{a)}
Vitamin B ₁ (mg)	1.3 ± 0.5	1.4 ± 0.4	1.4 ± 0.5	0.9 ± 0.4	1.0 ± 0.4	1.0 ± 0.5
Vitamin B ₂ (mg)	1.2 ± 0.4	1.2 ± 0.4	1.3 ± 0.6	1.1 ± 1.9	1.0 ± 1.0	1.0 ± 0.5
Vitamin C (mg)	93.2 ± 74.6	84.6 ± 56.3	84.3 ± 56.6	72.6 ± 65.0 ^{b)}	90.3 ± 75.9 ^{ab)}	98.7 ± 91.2 ^{a)}
Niacin (mgNE)	17.6 ± 7.1	16.4 ± 5.9	17.5 ± 5.7	10.7 ± 4.8 ^{b)}	11.8 ± 5.1 ^{ab)}	12.6 ± 5.8 ^{a)}
Cholesterol (mg)	301.6 ± 178.7	315.4 ± 170.8	296.4 ± 156.2	206.1 ± 155.2 ^{b)}	212.8 ± 146.5 ^{b)}	267.3 ± 233.5 ^{a)}

1) Low score group, 2) Normal score group, 3) High score group, 4) Mean ± S.D.

5) a b: Values with different superscripts are significantly different at $\alpha = 0.05$ level by Tukey's studentized range test.

group in the females consumed significantly higher levels of fiber, Ca, P, vitamin A, vitamin C, niacin, and cholesterol than the other groups.

Table 8 shows the nutrient intakes expressed as percentages of the RDA in the high score groups and the low score groups for both male and female subjects. For the male students, slightly lower intake levels of protein, vitamin A, niacin, and vitamin C were observed in the high score group, compared to the low score group. The intakes of energy, Ca, Vitamin B₂ for both groups were

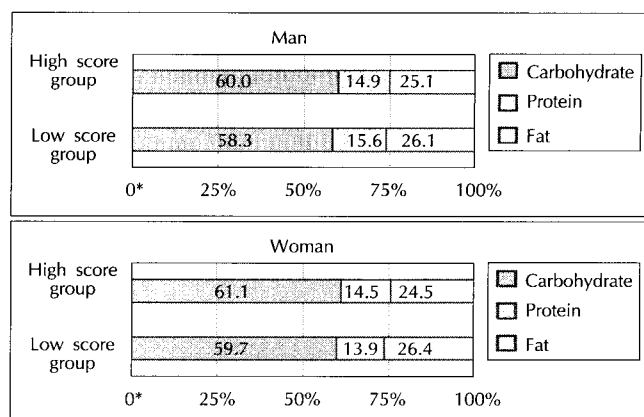
lower than the Korean RDA, while those of protein, P, Vitamin A, Vitamin B₁, Niacin and Vitamin C were sufficient. Among the female students, the high score group had higher intakes of energy, protein, Ca, P, vitamin A, niacin, and vitamin C than the low score group; only the intakes of P, vitamin A and vitamin C met the Korean RDA.

Table 9 shows the daily mean values of nutrient intakes by food source for each of the three groups. The levels of nutrient intakes from plant food and animal food were

Table 8. RDA% of nutrient intakes in the high and the low score groups

RDA%	Man		Woman	
	LG ¹⁾ (N = 54)	HG ²⁾ (N = 70)	LG (N = 92)	HG (N = 118)
Energy	81.6 ³⁾	85.6	61.6 ⁴⁾	71.4
Protein	113.9	113.1	74.5*	90.6
Ca	68.9	69.5	53.3*	65.5
P	158.3	160.2	109.6*	130.9
Vitamin A	121.1	110.9	74.5*	102.7
Vitamin B ₁	103.5	110.0	74.3	83.7
Vitamin B ₂	79.1	85.2	77.3	67.1
Niacin	103.4	103.2	66.1*	79.8
Vitamin C	133.2	120.4	103.7*	141.0

1) Low score group, 2) High score group, 3) RDA%, 4) *p < 0.05

**Fig. 2.** Energy distribution of three major nutrients in the two groups.**Table 9.** Daily mean values of nutrient intakes by food source in the three groups

		Man			Woman		
		LG ¹⁾ (N = 54)	NG ²⁾ (N = 99)	HG ³⁾ (N = 70)	LG ¹⁾ (N = 92)	NG ²⁾ (N = 170)	HG ³⁾ (N = 118)
Protein (g)	Animal	45.2 ± 20.6 ⁴⁾	41.1 ± 16.5	43.4 ± 16.8	25.1 ± 12.8	27.5 ± 15.4	29.3 ± 13.6
	Vegetable	34.5 ± 10.0	35.9 ± 10.6	35.8 ± 10.0	25.1 ± 9.3 ^{5a)}	26.7 ± 9.8 ^{b)}	30.5 ± 13.7 ^{a)}
Fat (g)	Animal	31.4 ± 17.9	30.6 ± 16.6	32.0 ± 18.3	19.3 ± 11.4	22.4 ± 15.3	21.0 ± 12.2
	Vegetable	29.7 ± 14.9	27.7 ± 11.9	27.7 ± 10.0	23.9 ± 12.0	22.4 ± 12.1	24.5 ± 14.1
Ca (mg)	Animal	252.3 ± 207.0	236.8 ± 188.3	266.8 ± 199.1	203.2 ± 155.0	237.5 ± 231.9	235.1 ± 182.5
	Vegetable	230.2 ± 94.4	234.9 ± 112.0	220.0 ± 91.4	170.2 ± 80.8 ^{b)}	193.5 ± 111.9 ^{ab)}	223.3 ± 134.2 ^{a)}
Fe (mg)	Animal	4.6 ± 3.0	4.2 ± 2.1	4.7 ± 2.6	2.6 ± 2.7	2.7 ± 1.8	2.9 ± 1.6
	Vegetable	6.8 ± 2.6	7.3 ± 3.8	7.3 ± 5.2	6.5 ± 8.5	6.4 ± 6.1	6.8 ± 4.2

1) Low score group, 2) Normal score group, 3) High score group, 4) Mean ± S.D.

5) a b: Values with different superscripts are significantly different at $\alpha = 0.05$ level by Tukey's studentized range test.

not significantly different among the groups in the males: more protein, fat and Ca intakes except Fe came from animal food than plant food, independently of the dietary behavior score. In the females, more protein, fat and Fe, but not Ca, were from plant foods: however, the high score group had significantly higher Ca and protein intakes from plant food than the low score group.

Fig. 2 shows the energy distribution (%) of three major nutrients in the high and the low dietary behavior groups. Energy intake from fats as a proportion of total energy intake was not significantly different between the high and the low score groups in both males and females. Among the three energy nutrients, the proportion of energy from carbohydrate, protein, and fat were 60 : 15 : 25 respectively. The fat intake as a percentage of energy in the low score group was slightly higher than that in the high score group.

DISCUSSION

This study was carried out to investigate the effect of dietary behavior on the nutritional status of 603 university students (223 males and 380 females). The results were as follows:

The subjects were aged between 20 and 24 years. The mean height, body weight and BMI of the male students were 174.6 cm, 67.7 kg, and 22.2, respectively, and those of the female students were 162.4 cm, 51.7 kg, and 19.7. No obese cases, on the basis of BMI, were found in this study.

1) Daily energy intake was 2075.4 kcal in the male students, and 1557.1 kcal in the female students. Both groups did not reach the Korean RDA energy level. The male students showed 112% of the RDA for protein, and the mean of protein intake levels of the female students was below the RDA. The % RDA for Ca in both males and females was 60–70%. The average of Ca intake of the female students was lower than that of the male students. The % RDA for Fe of the male and the female students was 97% and 79%, respectively.

2) The levels of nutrient intakes from plant food and animal food were not significantly different among the groups in the male students; more protein, fat and Ca, but not Fe, were from animal food in the female students, for all groups of females. However, the female students with high dietary behavior scores consumed significantly more vegetables and had significantly higher energy, protein, Ca, P, vitamin A and vitamin C intakes than the oth-

ers. Only P, vitamin A and vitamin C intakes were sufficient according to the RDA in the female high score group. Among the three energy nutrients, the proportion of energy from carbohydrate, protein, and fat were 60 : 15 : 25, respectively. The fat calories consumed by both groups constituted approximately 25% of the daily calorie intakes and was slightly higher than the 20% recommended by the Korean RDA.

The mean height and weight of the subjects were within the Korean adults' normal range, and obese cases - calculated on the basis of the BMI - were not found. Dietary intake data showed that the average daily intake of most nutrients did not meet the Korean RDA, except for vitamin C in the female students. Extreme consciousness of their physical appearances among female students may be one of the factors contributing to the low intakes of nutrients, especially Ca and Fe. Low intake of Fe for the female students is of particular concern. The Fe intake from animal food was lower than that from plant food in the female students. While fat energy percent of the female high score group was lower than the others, fat energy as a percent of the daily energy intake in both male and female groups was higher than the 20% recommended by the Korean dietary guidelines. These university students need to reduce fat intake in their diets. Moreover, it is important for the students to improve their dietary behaviors and overall dietary intakes. Nutrition education for university students is needed to improve their understanding of nutrition, which will eventually assist them in improving their intakes of foods and nutrients.

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