Evaluation of Nutrient Intake, Eating Behavior and Health-Related Lifestyles of Korean College Students*

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ABSTRACT

The purpose of this study was to investigate the nutrient intake, eating behaviors and health-related lifestyles of Korean non-nutrition major college students after they took a nutrition course. The subjects were 40 male and 147 female students at a university in Inchon. The results are summarized as follows: Average height of male and female students was 176.2 and 162.0 cm, respectively. Average weight was 66.2 and 52.3 kg, respectively. Average intake of calories, protein, vitamin A, vitamin C, vitamin B_1, vitamin B_2, niacin, and Ca was lower than Korean RDA. Fe intake of female students was lower than Korean RDA. Most students have had dietary problems such as overeating, eating unbalanced meals, and skipping meals. More than 60% of the students skipped breakfast. The main reason for skipping meals was lack of time. Most students didn't exercise regularly. About 40% of the students took vitamin or mineral supplements. As for smoking and alcohol use, 11.3% of the students drank alcohol and smoked, and 74.2% of them only drank alcohol. More than 30% of the students drank alcohol once a week. Most students ate out twice a week, and chose their based on taste rather than nutritional value. The main reason for eating out was simply to enjoy a meal. More than 60% of the students ate at places in or around campus. After taking the nutrition course, intake of milk and other dairy products, vegetables, fruits and protein-rich foods increased in female students. For both male and female students, intake of fat, sugar, processed foods, soft drinks, fried foods and spices decreased. Therefore, nutrition education had effect on non-nutrition major students, suggesting that proper nutrition education encouraged healthy eating habits on the part of college students.

KEY WORDS: nutrient intake, eating behavior, health-related lifestyles, nutrition education.

Introduction

It is important for college students to develop healthy lifestyles and desirable eating behavior because these habits are likely to continue in later life. However, Korean college students are generally preoccupied with academic work or involved with extracurricular activities and they may have little time to think about how to eat well on a limited budget. Many college students are unaware of the foods essential to good health and live mainly on a diet of inexpensive starchy foods and coffee.[1]

Inappropriate food intake can result from frequent snacks, skipped meals, monotonous diets, frequent consumption of fast foods, binge eating or excessive use of dietary supplements.[2-4] Alcohol abuse, tobacco use and a sedentary lifestyle also can affect nutrition status in college students. In the case of college women, most are preoccupied with their appearance, describe themselves as fat and have a strong desire for thinness, and show great interest in body image.[5,6] This situation leads to weight control attempts, such as skipping meals, compulsive exercising, compulsive eating and eating disorders.[7]

Unfortunately, the diets of college students in Korea often fail to meet current dietary recommendations, both in terms of specific nutrient intake and on the more basic level of food consumption.[8-10] The diets of young Korean adults are deficient in nutrients such as calories, calcium, iron, and vitamin A.[11-13] For their influence to be beneficial, nutrition education programs need to promote healthful eating habits.

For nutrition education to be effective, factors influencing food behavior should be investigated. Also nutritional understanding and education for college students is needed, and should focus on positive goals that are practical and achievable. Therefore, the purpose of this study was to provide current information on eating habits and nutrient intake among non-nutrition majors after they took a basic college-level nutrition course.

SUBJECTS AND METHODS

1. Subjects and period

The subjects were 200 Korean non-nutrition major col-

lege students who were taking a basic nutrition course. This survey was carried out using a self-administered questionnaire from June 1 to 15, 1999. For statistical analysis, 187 well-completed questionnaires were used from 190 collected (collection rate: 95%).

2. Questionnaire

The questionnaire included questions about demographic characteristics, nutrient intake, health-related lifestyle, dietary behaviors and eating out. Health-related lifestyle included physical exercise, smoking habits, alcohol use and use of vitamin or mineral supplements. Dietary behaviors included 9 items related to meal regularity, meal balance, self-recognition of food habits and skipping meals. Eating out included frequency, time, reason and place.

3. Anthropometric measurements

The mean height, weight, Body Mass Index (BMI), and percent body fat were measured for both male and female subjects. BMI was calculated by body weight in kilograms divided by height in meters squared. Percent body fat was measured with by a bioelectric impedance analyzer (Tanita TBF-611, Japan).

4. Dietary assessment

Three-day recall methods were used for dietary assessment. Nutrient, percent energy intake and food intake were analyzed using Computer-Aided Nutritional Program for Professionals (CAN-Pro 1997).

5. Statistical analysis

The statistical analysis was conducted using SAS Program. Frequency counts (%), mean and standard deviation were calculated for all variables and the Chi-square test was used to determine statistical significance. To compare differences in anthropometric data between male and female subjects, Students' t-test was used. The correlation between nutrient intake and anthropometric data was measured using Pearson's correlation coefficient.

RESULTS AND DISCUSSION

1. General characteristics of subjects

Table 1 presents general characteristics of the subjects. A total of 187 subjects (Male = 40, Female = 147) were studied and the average age of the male and female students was 21.7 and 19.5 years, respectively.

As for the education level of each subject's father, it was shown that 54.6% of subjects received a high school

education, 5.9% received a middle school education, 1.1% received an elementary school education, and 38.3% graduated from university or higher. As for the mother's education level, 54.6% received a high school education, 23.8% received a middle school education and 16.2% gra-

Table 1. General characteristics of the subjects

	Male (N = 40)	Female (N = 147)	Total (N = 187)
Age (years)	21.7 ± 3.2	19.5 ± 1.8	20.0 ± 2.3[1]
Father's education level			
□ Elementary	2 (1.1)	2 (1.4)	2 (1.1)[2]
Middle school	11 (5.9)	7 (4.8)	11 (5.9)
High school	101 (54.6)	80 (55.2)	101 (54.6)
□ University	71 (38.3)	56 (38.6)	71 (38.3)
Mother's education level			
□ Elementary	5 (12.5)	5 (3.4)	10 (5.4)
Middle school	13 (32.5)	31 (21.4)	44 (23.8)
High school	16 (40.0)	85 (58.6)	101 (54.6)
□ University	6 (15.0)	24 (16.6)	30 (16.2)
Father's job			
Administrative management	6 (15.0)	22 (15.3)	28 (15.2)
Professional	7 (17.5)	34 (23.6)	41 (22.3)
Service	7 (17.5)	19 (10.3)	26 (14.1)
Sales	7 (17.5)	14 (9.7)	21 (11.4)
Agriculture	2 (5.0)	2 (1.4)	4 (2.2)
Manufacture	1 (2.5)	14 (9.7)	15 (8.1)
Labor	0 (0.0)	1 (0.7)	1 (0.5)
Others	10 (25.0)	38 (26.4)	48 (26.1)
Mothers' job			
Employment	12 (30.0)	50 (34.5)	62 (33.5)
Housewife	28 (70.0)	95 (65.5)	123 (66.5)
Residence type			
Home w/parents	33 (82.5)	134 (92.4)	167 (90.3)
Boarding w/cooking	1 (2.5)	2 (1.4)	3 (1.6)
Boarding house or relative's home	2 (5.0)	4 (2.8)	6 (3.2)
Boarding w/o meals	4 (10.0)	5 (3.4)	9 (4.9)
Household income (10,000 won/month)			
□ 50	1 (2.6)	3 (2.2)	4 (2.3)
50 - 100	2 (5.3)	4 (2.9)	6 (3.4)
100 - 200	4 (10.5)	13 (9.4)	17 (9.7)
200 - 250	2 (5.3)	26 (18.8)	29 (15.9)
250 - 300	12 (31.6)	48 (34.8)	60 (34.1)
□ 300	17 (44.7)	44 (31.9)	61 (34.7)
Pocket money (10,000 won/month)			
□ 5	2 (5.1)	4 (2.7)	6 (3.3)
5 - 8	1 (2.6)	9 (6.2)	10 (5.4)
8 - 11	3 (7.7)	19 (13.1)	22 (12.0)
11 - 15	6 (15.4)	32 (22.1)	38 (20.6)
□ 15	27 (69.2)	81 (55.9)	108 (58.7)
Food cost rate in pocket money (%)			
□ 20	5 (12.5)	12 (8.4)	17 (9.3)
20 - 40	23 (57.5)	58 (40.6)	81 (44.3)
40 - 60	9 (22.5)	58 (40.6)	67 (36.6)
60 - 80	3 (7.5)	13 (9.1)	16 (8.7)
80 - 100	0 (0.0)	2 (1.4)	2 (1.1)

1): Mean ± S.D.   2): N (%)

duated from university or higher. As for the father's job, professionals accounted for 22.3%. As for the mother's job, housewives accounted for 66.5% and employed persons for 33.5%. As for residence type, 90.3% of the subjects lived at home with their parents and 6.5% of the subjects were boarding. Monthly household income was as follows: less than 0.5 million won 2.3%, 0.5-1 million won 3.4%, 1-2 million won 9.7%, 2-2.5 million won 15.9%, 2.5-3 million won 34.1%, 3 million or more 34.7%. As for pocket money per month, 58.7% of subjects received 150,000 won or more and 20.6% received 110-150,000 won. As for food cost as a percentage of pocket money, 44.3% of students were within 20-40%, 36.6% of students within 40-60%, 9.3% of students at less than 20%, 8.7% of students within 60-80% and 1.1% of students within 80-100%.

2. Anthropometric characteristics of the subjects

Anthropometric characteristics of the subjects are shown in Table 2. There were significant differences between genders. Their average body weight and height was similar to Korean standards for age.[14] The average

Table 2. Anthropometric data of the subjects

	Male (N = 40)	Female (N = 147)	Total (N = 187)
Height (cm)	176.2 ± 6.1[1]	162.0 ± 5.0***	165.1 ± 9.4
Weight (kg)	66.2 ± 8.3	52.3 ± 7.2***	55.4 ± 9.4
Body fat (%)	19.6 ± 5.6	25.6 ± 6.2***	25.0 ± 6.5
BMI[2]	21.3 ± 2.0	19.9 ± 2.3***	20.2 ± 2.3

1): Mean ± S.D
2): Asterisk means significant difference between male and female
    groups by Student's t-test (***p < 0.001)
4): BMI is body mass index [weight (kg)/height (m)²]

body fat of male and female subjects was 19.6 ± 5.6 and 25.6 ± 6.2%, respectively. The mean BMI of male students was 21.3 ± 2.0 kg/m² and the mean BMI of female students was 19.9 ± 2.3 kg/m². The average of total BMIs fell within the normal range.

The prevalence of obesity is shown in Fig 1. As for prevalence of obesity, 3.2% of subjects were overweight (5.0% male and 2.7% female), 40.6% were normal (57.5% male and 36.0% female), 56.1% were underweight (37.5% male and 61.2% female). The prevalence of obesity among subjects was lower compared to data in previous studies: 5.3%[15] and 6.1%.[16] Also it has been reported that the rate of underweight in women college students was 68.4%[17] which is higher than our data.

2. Dietary intake

Average daily intakes for energy and 14 nutrients are presented in Table 3. Males and females had similar mean intakes for most nutrients, although the mean
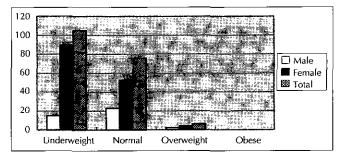

Fig. 1. Distribution of obesity by BMI in the subjects. BMI: body mass (kg/m²), Underweight: BMI < 20, Normal: 20 ≤ BMI < 25, Overweight: 25 ≤ BMI <27, Obese: BMI ≥ 27.

Table 3. Daily nutrition intake of the subjects

Nutrient	Male		Female	
	Mean ± S.D.	%RDA	Mean ± S.D.	%RDA
Energy (kcal)	1976.3 ± 669.8[1]	67.0[2]	1650.1 ± 707.0	70.4
Protein (g)	72.8 ± 26.8	79.9	57.1 ± 26.8	84.7
Fat (g)	56.1 ± 29.8		46.6 ± 25.6	
Carbohydrate (g)	284.0 ± 104.5		246.7 ± 107.9	
Vit A (RE)	596.6 ± 341.6	73.0	584.2 ± 449.2	79.1
Retinol (mg)	155.0 ± 130.5		149.9 ± 130.5	
Carotene (mg)	2314.7 ± 1663.6		2382.4 ± 2305.5	
Vit C (mg)	48.6 ± 27.1	80.8	53.1 ± 36.8	87.8
Vit B₁ (mg)	1.3 ± 0.7	83.4	1.0 ± 0.6	89.4
Vit B₂ (mg)	1.2 ± 0.5	63.9	1.0 ± 0.6	69.4
Niacin (mg)	14.5 ± 6.1	75.1	11.6 ± 6.3	79.3
Ca (mg)	484.9 ± 232.5	56.6	405.0 ± 233.3	50.7
P (mg)	1058.1 ± 364.4	122.1	858.8 ± 397.5	106.2
Fe (mg)	13.7 ± 12.1	100.1	10.0 ± 10.4	58.8
Na (mg)	3556.0 ± 1574.0		2890.0 ± 1612.0	

1): Mean ± S.D.   2): Percent Korean RDA values of daily nutrient intakes

values for females tended to be slightly lower. Female students had lower mean intakes for protein, calcium, and energy. This trend was similar to the results of previous domestic research; daily energy intake of subjects was higher than that of subjects in Mokpo,[15] but a little bit lower than that of college students in Taegu.[8] The mean intake of male students, which was only 67% of the Korean RDA, did not allow for a margin of safety for energy as it did for nutrients.

The % Korean RDA for protein of male and female students was 79.9 and 84.7%, respectively. The % Korean RDA for protein of male students was lower than the Korean average,[18] but that of female students was higher. The average vitamin A intake of the subjects was higher

compared to data in previous studies.[6][8][13] Nevertheless, the % Korean RDA of the subjects was considered insufficient.

As regards calcium, the average intake of the male and female students was 484.9 and 405.0 mg, respectively. The average calcium intake of female students was lower than that of male students. These results were lower than the those in previous studies.[8][15] The average intake of phosphorus (1,058.1 mg and 858.8 mg) was adequate for both the male and female students. A calcium to phosphorus ratio of approximately 0.46 – 0.47 : 1 would result in a relatively inefficient absorption of calcium.[14].

Low intake of iron was of special concern for female college students. In this study, the average intake of the

Table 4. Dietary behavior of the subjects

		Male	Female	Total	χ^2-test
Self-recognition of food habit	Overeating	14 (35.0)	83 (57.3)	97 (52.4)	$\chi^2 = 22.42^{N.S}$ DF=19
	Skipping meal	6 (15.0)	22 (15.2)	28 (15.1)	
	Unbalanced meal	8 (20.0)	13 (9.0)	21 (11.4)	
	Eating salty & spicy meal	11 (5.9)	19 (13.1)	30 (16.2)	
	Eating the meal left over	0 (0.0)	4 (2.8)	4 (2.2)	
	Others	1 (2.5)	3 (3.4)	4 (2.2)	
	Not answered	0 (0.0)	1 (0.7)	1 (0.5)	
Experience of skipping meal	Yes	34 (85.0)	132 (91.0)	166 (89.7)	$\chi^2 = 1.488^{N.S}$ DF = 2
	No	6 (15.0)	13 (9.0)	19 (10.3)	
Skipped meals	Breakfast	88 (62.8)	29 (72.5)	117 (65.0)	$\chi^2 = 9.394^{N.S}$ DF = 7
	Lunch	20 (14.3)	4 (10.0)	24 (0.1)	
	Dinner	21 (15.0)	1 (2.5)	22 (12.2)	
	None	8 (5.7)	5 (12.5)	13 (7.2)	
	Not answered	3 (2.1)	1 (2.5)	4 (2.2)	
Number of skipping meals	1 – 2 times/1 week	11 (28.2)	60 (42.9)	71 (40.0)	$\chi^2 = 0.251^{N.S}$ DF = 3
	3 – 4 times/ 1week	15 (38.5)	47 (33.6)	15 (38.5)	
	□ 5 times/week	8 (4.5)	25 (17.9)	8 (20.5)	
Reason of skipping meals	Lack of time for meals	18 (45.0)	81 (60.7)	99 (54.4)	$\chi^2 = 17.44^{N.S}$ DF = 17
	No appetite	5 (12.5)	12 (8.5)	17 (9.3)	
	Having an indigestion	0 (0.0)	4 (2.8)	4 (2.2)	
	Habitual	6 (15.0)	23 (16.2)	29 (15.9)	
	Weight loss	1 (2.5)	10 (7.0)	11 (6.0)	
	Others	5 (12.5)	5 (12.5)	10 (5.5)	
The degree of unbalanced diet	Ordinary	30 (50.0)	80 (55.2)	100 (54.1)	$\chi^2 = 0.942^{N.S}$ DF = 4
	Very severe	6 (15.0)	18 (12.4)	24 (13.0)	
	Severe	1 (2.5)	5 (3.4)	6 (3.2)	
Duration of meal tine	< 10 min	11 (27.5)	8 (5.5)	19 (10.3)	$\chi^2 = 19.44^*$ DF = 4
	< 20 min	22 (55.0)	82 (56.5)	104 (56.2)	
	< 30 min	7 (17.5)	49 (33.8)	56 (30.3)	
	≥ 30 min	0 (0.0)	6 (4.1)	6 (3.2)	
Important meals	Breakfast	8 (4.3)	42 (29.0)	50 (27.0)	$\chi^2 = 17.27^*$ DF = 5
	Lunch	8 (4.3)	61 (42.1)	69 (37.3)	
	Dinner	18 (9.7)	28 (19.3)	46 (24.9)	
	Always	6 (3.2)	14 (9.7)	20 (10.8)	
Overeaten meals	Breakfast	1 (2.6)	12 (8.3)	13 (7.1)	$\chi^2 = 21.00^*$ DF = 4
	Lunch	8 (20.5)	76 (52.8)	84 (45.9)	
	Dinner	30 (76.9)	52 (36.1)	82 (44.8)	
	Others	0 (0.0)	4 (2.8)	4 (2.2)	

N.S.: Not significant

female students was 58.8% of Korean RDA, but that of males was 100.1% of Korean RDA. Therefore, nutrition education for proper intake of iron appears necessary for female college students.

3. Dietary behavior

Results of dietary behavior are shown in Table 4. As for self-recognition of food habits, 52.4% of the subjects were aware of overeating, 16.2% of the subjects were aware of eating salty and spicy meals.

Self-efficacy for healthful eating is regarded as a significant predictor of actual eating behavior.[19] And 40.0% of the subjects skipped meals 1 – 2 times a week. Most

students ate lunch regularly, while 65.0% of students skipped breakfast. As found in another study,[20] skipping lunch was less common than skipping breakfast or dinner. Breakfast-skipping may be attributed to the absence of a defined breakfast period and the fact that students may have little time for eat. As the reason for skipping meals, 54.4% of the subjects cited a lack of time and 15.9% of students attributed it to habit. More than half students said they had an ordinary diet, while 13.0% of the subjects felt they had a severely unbalanced diet. As for duration of mealtime, 60.5% of the subjects said less than 20 minutes. As for the most important meal, 37.3% of the subjects answered lunch and 27.0% of the students answ-

Table 5. Health-related life styles of the subjects

		Male	Female	Total	χ^2-test
Type of exercise	None	10 (34.5)	75 (69.4)	85 (62.0)	$\chi^2 = 48.77^{NS}$ DF = 10
	Mountain climbing	1 (3.4)	1 (0.9)	2 (1.5)	
	Jogging	3 (10.3)	14 (13.0)	17 (12.4)	
	Squash tennis	0 (0.0)	0 (0.0)	0 (0.0)	
	Aerobics	0 (0.0)	2 (1.9)	2 (1.5)	
	Swimming	0 (0.0)	2 (1.9)	2 (1.5)	
	Badminton	0 (0.0)	0 (0.0)	0 (0.0)	
	Basket ball	10 (34.5)	0 (0.0)	10 (7.3)	
	Others	5 (17.2)	14 (13.0)	19 (13.9)	
Frequency of exercise	1 time/month	3 (10.7)	21 (19.4)	24 (17.7)	$\chi^2 = 11.65^{NS}$ DF = 5
	1 time/2 weeks	3 (10.7)	10 (9.3)	13 (9.6)	
	1 week	7 (5.2)	32 (29.6)	39 (28.7)	
	2 – 4 times/week	14 (50.0)	25 (23.2)	39 (28.7)	
	Everyday	1 (3.6)	20 (18.5)	21 (15.4)	
Vitamin or mineral supplements	Experienced	45 (42.9)	10 (37.0)	55 (41.7)	$\chi^2 = 2.893^{NS}$ DF = 3
	Taking	6 (5.7)	0 (0.0)	6 (4.6)	
	No experience	54 (51.4)	17 (63.0)	71 (53.8)	
Food supplements	Experienced	6 (22.2)	19 (28.4)	25 (26.6)	$\chi^2 = 6.050^{NS}$ DF
	Taking	0 (0.0)	2 (3.0)	2 (2.1)	
	No experience	21 (77.8)	46 (68.7)	67 (71.3)	
Smoking & Alcohol	Smoking & alcohol	15 (38.5)	6 (4.1)	21 (11.3)	$\chi^2 = 41.34^*$ DF = 3
	Smoking	1 (2.6)	1 (0.7)	2 (1.1)	
	Alcohol	16 (41.0)	122 (83.0)	138 (74.2)	
	None	7 (17.9)	18 (12.2)	25 (13.4)	
Number of cigarettes (/day)	None	16 (50.0)	77 (90.6)	93 (79.5)	$\chi^2 = 26.16^*$ DF = 3
	< 1/2 packet	5 (15.6)	5 (5.9)	10 (8.5)	
	< 1 packet	9 (28.1)	2 (2.3)	11 (9.4)	
	< 2 packet	2 (6.2)	1 (1.2)	3 (2.6)	
Frequency of alcohol	None	6 (16.2)	10 (6.8)	16 (8.7)	$\chi^2 = 43.98^{NS}$ DF = 3.89
	1 – 2 times/month	10 (27.0)	10 (6.8)	47 (25.7)	
	1 time/week	10 (27.0)	37 (25.3)	59 (32.2)	
	2 – 3 times/week	10 (27.0)	49 (33.6)	56 (30.6)	
	4 – 5 times/week	1 (2.7)	46 (31.5)	4 (2.2)	
	≥ times/week	0 (0.0)	3 (2.0)	1 (0.5)	
Amount of drink at once	None	6 (15.8)	10 (6.9)	16 (8.8)	$\chi^2 = 36.79^*$ DF = 4
	≤ soju 1 bottle	9 (23.7)	98 (68.1)	107 (58.8)	
	≤ soju 2 bottle	13 (34.2)	32 (22.2)	45 (24.7)	
	≤ soju 3 bottle	9 (23.7)	3 (2.1)	12 (6.6)	
	□ soju 3 bottle	1 (2.6)	1 (0.7)	2 (1.1)	

N.S.: Not significant

ered breakfast. As for the meal at which they typically overeat, 45.9% of the subjects said lunch and 44.8% of students said dinner.

5. Health-related life styles

Since the earliers reports,[21)22)] the close association between health-related practices and good physical health status has been further demonstrated. Sixty-two percent of the subjects took no exercise, 36.6% practiced jogging, basketball, aerobics, swimming and others. As for frequency of exercise, 57.4% of students took exercise 1 – 4 times a week, 17.7% of students once a month, 15.4% of students every day (Table 5).

Nutrient supplements were used by 46.3% of the subjects. Regarding food supplements, 71.3% of the subjects

had no experience with them. A wide variety of supplements were used, including multivitamins and mineral supplements. In previous studies,[13)22)] it was found that vitamin and mineral supplements were taken by 31.3% of the subjects.

Among the subjects, 74.2% drank alcohol and 11.3% of the subjects smoked and drank alcohol. Eighty-eight percent of the subjects drank alcohol less than 2 – 3 times a week and 58.8% of the subjects drank less than 1 bottle of soju.

6. Eating out

As for frequency of eating-out, 46.7% of the students ate out twice a week and 11.1% rarely ate out (Table 6). Boarding students ate out more frequently. As for which

Table 6. Eating out of the subjects

		Male	Female	Total	χ^2-test
Frequency	1 – 2 time/month	7 (17.9)	13 (9.2)	20 (11.1)	
	2 – 3 times/week	11 (28.2)	51 (36.2)	62 (34.4)	$\chi^2 = 4.57^{N.S}$
	2 times/week	17 (43.6)	67 (47.5)	84 (46.7)	
	3 times/week	1 (2.6)	3 (2.1)	4 (2.2)	DF = 7
	Not answered	2 (5.1)	3 (2.1)	5 (2.8)	
Time	Breakfast	0 (0.0)	0 (0.0)	0 (0.0)	
	Between breakfast and lunch	0 (0.0)	2 (1.4)	2 (1.1)	
	Lunch	24 (63.1)	99 (70.7)	123 (69.1)	
	Between lunch and dinner	1 (2.6)	4 (2.9)	5 (2.8)	$\chi^2 = 10.29^{N.S}$
	Dinner	7 (18.4)	18 (12.9)	25 (14.0)	DF = 11
	Midnight meal	2 (5.3)	2 (1.4)	4 (2.2)	
	≥ 2 times/day	3 (7.9)	15 (10.7)	18 (10.1)	
	Not answered	1 (0.6)	0 (0.0)	1 (0.6)	
Reason	Social	4 (10.5)	26 (18.4)	30 (16.8)	
	Taste	7 (18.4)	17 (12.1)	24 (13.4)	
	Meal	15 (38.4)	77 (54.6)	92 (51.4)	
	Save time	6 (15.8)	7 (5.0)	13 (7.3)	$\chi^2 = 21.76^{N.S}$
	Nutrition	0 (0.0)	1 (0.7)	1 (0.6)	DF = 15
	Others	5 (13.2)	13 (9.2)	18 (10.1)	
	Not answered	1 (2.6)	0 (0.0)	1 (0.6)	
Place	Korean restaurant	6 (16.2)	38 (27.0)	44 (24.7)	
	Chinese restaurant	1 (0.7)	1 (0.7)	2 (1.1)	
	European-style restaurant	2 (0.7)	1 (0.7)	3 (1.7)	
	Campus cafeteria & snack corner	15 (40.5)	46 (32.6)	61 (34.3)	$\chi^2 = 20.48^{N.S}$
	Restaurants around campus	8 (21.6)	43 (30.5)	51 (28.6)	DF = 18
	Others	4 (10.8)	12 (8.5)	16 (9.0)	
	Not answered	1 (2.7)	0 (0.0)	1 (0.6)	
Criteria for selection	Taste	22 (56.4)	87 (61.7)	109 (60.5)	
	Satiety	1 (2.6)	8 (5.7)	9 (5.0)	
	Health	2 (5.1)	6 (4.3)	8 (4.4)	$\chi^2 = 14.33^{N.S}$
	Price	10 (25.6)	26 (18.4)	36 (20.0)	DF = 12
	Irrelative	3 (7.7)	8 (5.7)	11 (6.1)	
	Others	1 (2.6)	6 (4.3)	7 (3.9)	
Preference between homemade & eating out	Homemade	22 (59.5)	67 (49.3)	89 (51.2)	
	Eating out	8 (21.6)	31 (22.8)	39 (22.5)	$\chi^2 = 2.023^{N.S}$
	Identical	6 (16.2)	27 (19.8)	33 (19.1)	DF = 3
	Irrespective	1 (2.7)	11 (8.1)	12 (6.9)	

N.S.: Not significant

meal they at outside the home, 69.1% of the students said lunch and 14.0% of the students said dinner. The main eating for eating out was to strengthen social relationships. As for eating place, 34.3% of the students had the meal in campus cafeterias or snack corners. They ate out at Korean restaurants and restaurants around campus at a rate of 24.7 and 28.6%, respectively. As the criteria for selection of eating place, 60.5% of the students considered taste and 20.0% of the students considered price. Also, 51.2% of the students preferred homemade foods and 22.5% of the students liked to eat out.

Table 7. Correlation coefficient between daily nutrient intake and anthropometric measurements

	Male			Female		
	Height	Weight	BMI	Height	Weight	BMI
Energy (kcal)	.134*	.053	−.021	.332**	−.029	−.198*
Protein (g)	.045	.098	.098	.210*	.089	−.031
Fat (g)	.164	.099	.044	.240*	.132	−.276**
Carbohydrate (g)	.134	−.045	−.081	.250*	−.019	−.189
Vit A (RE)	.087	.134*	.079	.198	−.050	−.220
Vit C (mg)	.132*	.143*	.089	−.012	−.070	−.069
Vit B₁ (mg)	.089	.017	.033	.150	.030	−.032
Vit B₂ (mg)	.068	.155	.184	.298*	.085	−.102
Niacin (mg)	.067	.031	.077	.210	.142	−.041
Ca (mg)	.051	.011	−.019	.180	−.004	−.172
Fe (mg)	.011	.076	.078	.192	.087	−.165

*: significant at $p < 0.05$, **: significant at $p < 0.01$

Table 8. Nutrition knowledge score and self-recognized changes in food behavior, health - related lifestyles and after taking nutrition course

		Male	Female	Statistics
Nutrition knowledge score		35.1 ± 6.4[1]	36.7 ± 4.2	T = 1.55[N.S.]
Increase of milk & dairy foods	Yes	27 (67.5)	82 (55.7)	
	No	0 (0.0)	2 (1.3)	
Increase of vegetables and fruit	Yes	19 (47.5)	64 (43.5)	
	No	1 (2.5)	8 (5.4)	
Increase of protein-rich foods	Yes	21 (52.5)	62 (42.1)	
	No	0 (0.0)	4 (2.7)	
Decrease of fat & sugar	Yes	11 (25.5)	49 (33.3)	
	No	4 (10.0)	11 (7.5)	
Decrease of using spice	Yes	14 (35.0)	35 (23.8)	
	No	2 (5.0)	9 (6.1)	
Decrease of total energy intake	Yes	3 (7.5)	28 (19.1)	
	No	6 (15.0)	6 (4.1)	
Decrease of processed foods	Yes	24 (60.0)	60 (41.0)	
	No	1 (2.5)	5 (3.4)	
Decrease of soft drink	Yes	12 (30.0)	56 (38.1)	
	No	3 (7.5)	7 (4.8)	
Decrease of fried-foods	Yes	25 (62.5)	81 (55.1)	
	No	1 (2.5)	3 (2.0)	
Increase of regular exercise	Yes	12 (30.0)	57 (38.8)	
	No	1 (2.5)	2 (1.3)	
Decrease of drinking alcohol	Yes	15 (37.5)	29 (19.7)	
	No	3 (7.5)	11 (7.5)	
Decrease of smoking	Yes	8 (20.0)	5 (3.4)	
	No	0 (0.0)	5 (3.4)	
Improvement of food habit	Yes	16 (40.0)	38 (25.9)	
	No	2 (5.0)	5 (3.4)	
Increase of iron-rich foods	Yes	3 (7.5)	21 (14.3)	
	No	3 (7.5)	10 (6.8)	
Increase of interest in health	Yes	32 (80.0)	114 (77.8)	
	No	0 (0.0)	0 (0.0)	

N.S.: Not significant

7. Correlation coefficient between daily nutrient intakes and anthropometric measurements

The relation between nutrient intake and anthropometric measurements is shown in Table 7. In male students, calories and vitamin C were correlated with height (p < 0.05), and for female students, calories (p < 0.01), protein, fat, carbohydrates, and vitamin B_2 (p < 0.05) were positively correlated with height (p < 0.05). For male students, vitamin A and vitamin C are were positively correlated with weight (p < 0.05). In terms of BMI, male students were not correlated with nutrient intake, but female students were inversely correlated with energy (p < 0.05) and fat (p < 0.01).

8. Nutrition knowledge score and self-recognized changes in food behavior and health-related lifestyles after taking nutrition course

Nutrition knowledge score and self-recognized changes in food behavior and health-related lifestyles of the subjects after taking the nutrition course are shown in Table 8. Nutrition knowledge was scored out of 50, and the mean scores of male and female students were 35.1 and 36.7, respectively. Intake of milk, dairy foods, vegetables, fruits and protein-rich foods increased in female students. For both male and female students, intake of fat, sugar, processed foods, soft drinks, fried foods and spicy foods decreased. Regular exercise increased in most of the students after taking the nutrition course. Male students drank less alcohol. After taking the nutrition course, about 40% of the male students improved their eating habits. Most of the students had an increased interest in health after taking the nutrition course. These results suggest that nutrition education may be effective for improving the overall health of non-nutrition major college students.

SUMMARY AND CONCLUSION

This study was undertaken among 40 male and 147 female students at a university in Inchon for the purpose of investigating nutrient intake, eating behavior and health-related lifestyles of non-nutrition majors after they took a basic college-level nutrition course. Anthropometry was conducted to determine obesity and data was obtained on nutrient intake, eating behaviors and health-related lifestyle using questionnaires.

Average height of male and female students was 176.2 and 162.0 cm, respectively. Average weight was 66.2 and 52.3 kg, respectively. Mean BMI of male and female stu-

dents was 21.3 and 19.9, respectively. Nutrient intake among subjects was generally lower than the Korean RDA, except phosphorus. For female students, iron intake was below 60% of the Korean RDA. Subjects showed undesirable eating behaviors, including having irregular meals, skipping meals, and eating quickly. More than 60% of the students tend to skip breakfast. The main reason for skipping meals was lack of time. Most students didn't exercise regularly. About 40% of the students used vitamin or mineral supplements. As for drinking and smoking, 11.3% of the students drank alcohol and smoked, 74.2% only drank alcohol. More than 30% of the students drank alcohol once a week. Most students ate out twice a week, and chose their meal based on taste. The main reason for eating out was simply to have a meal. More than 60% of the students ate out at a place on or around campus. It was revealed that non-nutrition major students acquired nutrition knowledge and improved dietary behavior after taking a nutrition course. Although this study did not reveal significant differences in nutrition knowledge or eating behaviors between male and female students, this study provides basic information for developing a nutrition education program for college students.

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