J Community Nutrition 5(3) : 151~159, 2003 □ **Original Article** □

Weight-Control Attempt by Korean College Students Participating in a Nutrition Education Class via the Internet ; Skipping Dinner or Exercise

Jeong Hee Lee, Jin Sook Kim, Mi Young Lee, Sun Hee Cheong, Kyung Ja Chang†

Department of Food and Nutrition, College of Human Ecology, Inha University, Incheon, Korea

ABSTRACT

The purpose of this study was to investigate the difference in dietary attitudes, dietary behaviors and health-related lifestyles among Korean college students(392 males, 808 females) participating in a web class of nutrition education. This cross-sectional survey was conducted by a self-administered questionnaire and data was analyzed by SPSS program. Most female subjects with weight-control attempt had eating habit problems such as overeating and food jags. The female subjects with weight-control attempt showed significantly higher rate of skipping dinner compared to those without weight-control attempt. As for frequency of exercise, the subjects with weight-control attempt exercised more frequently compared to those without weight-control attempt. In subjects, weight-control attempt was significantly associated with exercise. Nutrient adequacy ratio and mean adequacy ratio of the subjects with weight-control attempt were significantly lower compared to those without weight-control attempt. These results suggest that skipping dinner or exercise might be used as weight-control methods in Korean college female students participating in a nutrition education class via the internet. (*J Community Nutrition* 5(3) : 151~159, 2003)

KEY WORDS : college student · weight-control attempt · skipping meal · exercise · MAR · INQ.

Introduction

In college, students change adulthood physically and socially. Because of keeping inappropriate dietary behavior, incidence or prevalence rate of life habit diseases such as cardiac vascular disease(CVD), cancer and osteoporosis would be increased in middle age(Schlenker 1984). Therefore, it is important to prevent these diseases with optimal nutrition care in early adulthood of college students. Especially, in the case of female students unlike male students, nutrition care is needed to prepare for experience of pregnancy, delivery and lactation(Schlenker 1984 ; Lee 2000). But it was reported that female college students had more nutritional problem than male college students in study on the actual nutrition condition of Korean college students (Choi, Jo 1999 ; Kim 1984 ; You et al. 1994). Unfortunately, the diets of college students in Korea often fail to meet current dietary recommendation, both in terms of specific nutrient intake and level of food consumption (Choi, Jo 1999 ; Choi et al. 2000 ; Lee et al. 1996). Inappropriate food intake of college students can result from frequent snacks, skipping meals, monotonous diets, frequent consumption of fast foods, binge eating or excessive use of dietary supplements(Jacobson 1995 ; Kim et al. 1995 ; Brevard, Ricketts 1996). Alcohol abuse, tobacco use and a sedentary lifestyle also can affect nutrition status in college students(Kwon, Chang 2000).

College women describe themselves as fatter and have strong desire for thinness, and show great interest in body image(Kim et al. 1998 ; Park et al. 1997 ; Won 1998). Young women have commonly relied on weight control methods such as skipping meals and excess exercise(Kim et al. 1998). The practice of unnecessary weight control was also frequently reported among college female students in Korea(Kim et al. 1998 ; Park et al. 1997).

Nutrition education for proper dietary behaviors and

† **Corresponding author** : Kyung Ja Chang, Department of Food and Nutrition, College of Human Ecology, Inha University, 253 Younghyeun-dong, Nam-ku, Incheon 402-751, Korea
Tel : (031) 860-8126, Fax : (031) 862-8120
E-mail : kjchang@inha.ac.kr

health-related lifestyles may be necessary for college students who have weight-control attempt to maintain health. Therefore, the purpose of this study was to examine dietary attitudes, health-related lifestyles, overall dietary quality by weight-control attempt among Korean college students participating in a nutrition education class via the internet.

Subjects and Methods

1. Subjects

The subjects were 1200 healthy college students from males(n = 392) and females(n = 808) which participated in a nutrition education class on the nutrition knowledge and weight control method via the internet. The subjects were divided into two subgroups by weight-control attempt ; subjects with or without weight-control attempt. A cross-sectional study was carried out using a self-administered questionnaire from May 1 to May 31, 2000.

2. Questionnaire

The questionnaire included items about general characteristics, dietary attitudes and behaviors, and health-related lifestyles. Items about dietary attitudes and behaviors included self-recognition of eating habit problem, food balance, skipping meals, meal regularity, speed of meal, and frequency of snack. Items about health-related lifestyles included self-reported health status, concern about health, and frequency of exercise.

Dietary attitudes were measured using a scale composed of 11 items. The scale included items such as perceived importance of nutrition in food selection or consumption, attitude toward processed food or eating out, interest in food consumption, interest in nutrition and health, attitude toward avoiding salty foods, and so on. Each item was rated on a 3 point scale of 'always'(1) to 'not at all'(3), and overall score was ranged from 11 to 33, with higher score indicating more favorable dietary attitude.

3. Dietary assessment

Three-day recall method was used for dietary assessment (2-weekdays and 1-weekend day). Nutrient intake was analyzed the Computer-Aided Nutritional Analysis Program for Professionals(Can-Pro, Korean Society of Nutrition 1997).

The nutrient adequacy ratio(NAR) represents an index of adequacy for a nutrient based on the corresponding Korean recommended daily allowance(RDA) for that nutrient. The NAR is expressed as follows :

$$NAR = \frac{\text{The subject's daily intake of a nutrient}}{\text{RDA of that nutrient}}$$

The nutrients selected for the calculation of NAR were nine nutrients(protein, calcium, phosphorus, iron, vitamin A, vitamin B_1, vitamin B_2, niacin, and vitamin C). The NAR values were always truncated at 1.00, to prevent intakes in excess of the RDA for any nutrient from increasing the index. The NAR values for each of the selected nutrients were then averaged to yield a mean adequacy ratio (MAR) for each subject. The MAR provides an index of the overall quality of the diet[15].

$$MAR = \frac{\text{Sum of the NARs for 9 nutrients}}{9}$$

The resulting ratio provides the index of nutritional quality(INQ)(Hansen 1973), which relates the quantity of selected nutrients in 1,000kcal of a food or diet to the amounts of those nutrients and kilocalories recommended for the maintenance of good health :

$$INQ = \frac{\text{Amount of nutrient in 1000kcal of food or diet}}{\text{RDA per 1000kcalnt}}$$

Foods or diets with INQ values of 1 or greater have sufficient nutrient value in proportion to their energy content to meet nutrient allowances when consumed at recommended energy levels. INQ values less than 1 indicate that the nutrient content of the food or diet, in relation to its energy content, is not sufficient to meet recommended standard.

4. Data analysis

The statistical analysis was conducted using a SPSS 10.0 program. Frequency counts(%), mean and standard deviation were calculated for all variables. Chi-square test was used to determine statistical differences in proportions. To compare differences in score and nutrient intakes between subjects with or without weight-control attempt, Student's t-test was used.

Results

Subjects trying to lose weight were 21.7%(n = 85) in males and 67.0%(n = 541) in females and they were categorized into subgroups with or without weight-control attempt. Mean age of male subjects with or without weight-

control attempt were 24.3 and 24.2 years old, respectively. In case of female subjects, mean age of those with or without were weight-control attempt 22.4 and 22.1 years old, respectively.

Dietary attitudes and behaviors in male and female subjects are shown in Table 1. There was no significant difference in self-recognition of eating habit problem between male subjects with and without weight-control attempt ; 31.0% of those with weight-control attempt had overeating, 30.9% did no problem, and 23.8% did skipping meal, and

Table 1. Dietary behaviors of the subjects by weight-control attempt N(%)

	Male		Female	
	Attempt(n = 85)	Non-attempt(n = 307)	Attempt(n = 541)	Non-attempt(n = 267)
Self-recognition of eating habit				
No problem	26(30.9)	111(36.3)	106(19.6)	64(24.0)
Food jags	8(9.5)	41(13.4)	129(23.8)	53(19.8)
Overeating	26(31.0)	63(20.6)	152(28.1)	56(21.0)
Skipping meal	20(23.8)	79(25.8)	119(21.8)	82(30.7)
Eating salty & spicy meal	4(4.8)	12(3.9)	36(6.7)	12(4.5)
p value	p <0.326$^{N.S.\ 1)}$		p <0.009$^{**2)}$	
Experience of skipping meals				
Breakfast	71(84.5)	244(81.9)	358(67.3)	204(77.6)
Lunch	5(6.0)	36(12.1)	63(11.8)	37(14.0)
Dinner	8(9.5)	18(6.0)	111(20.9)	22(8.4)
p value	p <0.172$^{N.S.}$		p <0.000***	
Reason of skipping meals				
Lack of time for meals	27(32.1)	111(37.2)	243(45.7)	134(51.0)
No appetite	7(8.3)	50(16.8)	50(9.4)	34(12.9)
Having an indigestion	0(0.0)	9(3.0)	25(4.7)	8(3.1)
Habitual	19(22.6)	50(16.8)	72(13.5)	39(14.8)
Weight loss	10(11.9)	0(0.0)	81(15.2)	3(1.1)
Oversleeping	15(17.9)	68(22.8)	54(10.2)	35(13.3)
Others	6(7.2)	10(3.4)	7(1.3)	10(3.8)
p value	p <0.000***		p <0.000***	
Speed of meal				
> 20min	6(7.0)	19(6.2)	132(24.4)	72(27.0)
10 - 20min	39(45.9)	182(59.3)	316(58.4)	154(57.7)
< 10min	40(47.1)	106(34.5)	93(17.2)	41(15.3)
p value	p <0.082$^{N.S.}$		p <0.655$^{N.S.}$	
Frequency of overeating				
0 - 1/week	10(11.8)	50(16.3)	71(13.1)	50(18.7)
2 - 3/week	41(48.2)	176(57.3)	330(55.7)	153(57.3)
Often	34(40.0)	81(26.4)	133(23.2)	64(24.0)
p value	p <0.048*		p <0.110$^{N.S.}$	
Frequency of snack				
1 - 2/week	22(25.9)	61(19.9)	53(9.8)	33(12.4)
3 - 4/week	26(30.6)	103(33.6)	154(28.5)	81(30.3)
1/day	27(31.8)	93(30.3)	202(37.3)	92(34.5)
2 - 3/day	9(10.6)	37(12.1)	117(21.6)	50(18.7)
≥ 4/day	1(1.2)	7(2.3)	13(2.4)	9(3.4)
Others	0(0.0)	6(2.0)	2(0.4)	2(0.7)
p value	p <0.617$^{N.S.}$		p <0.610$^{N.S.}$	

1) N.S. : Not significant by χ^2-test, 2) * : p < 0.05, ** : p < 0.01, *** : p < 0.001 by χ^2-test

36.3% of those without weight-control attempt did no problem, 25.8% did skipping meal, and 20.6% did overeating. There was a significant difference in self-recognition of eating habit problem between female subjects with and without weight-control attempt ; 28.1% of those with weight-control attempt had overeating, 23.8% did food jags, and 21.8% did skipping meal, and 30.7% of those without weight-control attempt did skipping meal, 24.0% did no problem, and 21.0% did overeating. Most of male subjects had skipping breakfast and subjects with weight-control attempt had more skipping meal compared to those without weight-control subjects, which did not show significant difference. There was a significant difference in skipping meal between female subjects with and without weight-control attempt ; 67.3% of female subjects with the weight-control attempt skipped breakfast, and 20.9% did dinner, and 77.6% of those without weight-control attempt skipped breakfast, and 14.0% did lunch. There was a significant difference in reason of skipping meal between male subjects with and without weight-control attempt ; 32.1% of those with weight-control attempt answered 'lack of the time for meals', 22.6% did 'habitual', and 17.9% did 'oversleeping' and 37.2% of those without weight-control attempt did 'lack of the time for meals', 22.8% did 'oversleeping', 16.8% did 'no appetite', 16.8% did 'habitual'. There was a significant difference in reason of skipping meal between female subjects with and without weight-control attempt ; 45.7% of those with weight-control attempt answered 'lack of time for meals', 15.2% did 'weight loss', and 13.5% did 'habitual' and 51.0% of those with weight-control attempt did 'lack of the time for meals', 14.8% did 'habitual', and 13.3% did 'oversleeping'.

The score of dietary attitudes is shown in Table 2. There was a significant difference in score of dietary attitudes between male subjects with and without weight-control attempt ; scores of those with and without weight-control attempt were 23.2 and 22.9 out of 33, respectively. There was a significant difference in two items, 'I would really like to change my eating habits' and 'I always take care not to take salt', between female subjects with and without weight-control attempt. There was a significant difference in score of dietary attitude between female subjects with and without weight-control attempt ; scores of those with and without weight-control attempt were 23.5 and 23.1, respectively.

Health-related lifestyles in male and female subjects are shown in Table 3. There was no significant difference in self-reported health status between male subjects with and without weight-control attempt ; 48.2% of those with weight-control attempt answered 'normal', 38.8% did 'good', and 13.0% did 'poor', and 57.3% of those without weight-control attempt did 'normal', 35.5% did 'good', and 7.2% did 'poor'. There was no significant difference in self-reported health status between female subjects with and without weight-control attempt ; 62.1% of those with weight-control attempt answered 'normal', 20.5% did 'good', and 17.4% did 'poor', and 65.2% of those without weight-control attempt did 'normal', 20.2% did 'good', and 14.6% did

Table 2. Dietary attitudes score of the subjects by weight-control attempt

	Male		Female	
	Attempt (n = 85)	Non-attempt (n = 307)	Attempt (n = 541)	Non-attempt (n = 267)
Eating a lot of food that I want is more important than nutrition	2.0 ± 0.5	2.0 ± 0.5[1)]	2.0 ± 0.5	1.9 ± 0.4**[2)]
I eat whatever I want	1.7 ± 0.5	1.7 ± 0.5	1.8 ± 0.5	1.7 ± 0.5
Price of food is more important than nutrition	2.2 ± 0.6	2.0 ± 0.5	2.1 ± 0.5	2.1 ± 0.5
If I take vitamin pill, I don't have to worry about my health	2.8 ± 0.4	2.8 ± 0.5	2.8 ± 0.4	2.8 ± 0.5
I am willing to use instant foods when I am busy	1.9 ± 0.4	1.9 ± 0.5	1.9 ± 0.5	2.0 ± 0.4
If possible, I would like to eat out	2.2 ± 0.5	2.2 ± 0.6	2.2 ± 0.5	2.2 ± 0.6
I am interested in information on nutrition and health	2.1 ± 0.6	2.0 ± 0.6*	2.2 ± 0.6	2.0 ± 0.6***
I am always interested in what I am going to	2.0 ± 0.7	2.0 ± 0.6	2.5 ± 0.6	2.4 ± 0.6*
I always take care not to take salt	1.9 ± 0.8	1.9 ± 0.7	1.9 ± 0.8	1.8 ± 0.7
I am not satisfied with meals	2.3 ± 0.6	2.3 ± 0.6	2.3 ± 0.6	2.3 ± 0.6
I would really like to change my eating habits	1.9 ± 0.6	2.2 ± 0.6***	1.8 ± 0.6	2.0 ± 0.6***
Total Score of dietary attitudes	23.2 ± 2.5	22.6 ± 2.3	23.5 ± 2.6	23.1 ± 2.2*

1) mean ± SD
2) * : $p < 0.05$, ** : $p < 0.01$, *** : $p < 0.001$ by Student's t-test
3) Each item could range from 1 - 3

'poor'. There was no significant difference in frequency of exercise between male subjects with and without weight-control attempt ; 31.8% of those with weight-control attempt answered 'everyday', 25.9% did 'twice a week', and 20.0% did 'once a week', and 25.1% of those without weight-control attempt did 'once a week', 24.1% did 'twice a week', and 22.5% did 'everyday'. There was a significant difference in frequency of exercising between female subjects with and without weight-control attempt ; 34.2% of those weight-control attempt answered 'none', 20.9% did 'twice a week', and 17.2% did 'once a week', and 54.3% of those without weight-control attempt did 'none', 16.1% did 'once a month', and 13.5% did 'once a week'.

Table 3. Health-related life style of the subjects by weight-control attempt N(%)

	Male		Female	
	Attempt (n = 85)	Non-attempt (n = 307)	Attempt (n = 541)	Non-attempt (n = 267)
Self-reported health states				
Poor	11(13.0)	22(7.2)	94(17.4)	39(14.6)
Normal	41(48.2)	172(57.3)	336(62.1)	174(65.2)
Good	33(38.8)	109(35.5)	111(20.5)	54(20.2)
p value	p <0.147$^{N.S.\ 1)}$		p <0.575$^{N.S}$	
Interest in health				
Never	5(5.9)	16(5.2)	22(4.1)	13(4.9)
Normal	38(44.7)	165(53.7)	320(59.1)	175(65.5)
Much	42(49.4)	126(41.1)	199(36.8)	79(29.6)
p value	p <0.334$^{N.S.}$		p <0.126$^{N.S}$	
Frequency of exercise				
None	13(15.3)	54(17.6)	185(34.2)	145(54.3)
1/month	6(7.0)	33(10.7)	68(12.6)	43(16.1)
1/week	17(20.0)	77(25.1)	93(17.2)	36(13.5)
2/week	22(25.9)	74(24.1)	113(20.9)	22(8.2)
Everyday	27(31.8)	69(22.5)	82(15.2)	21(7.9)
p value	p <0.371$^{N.S.}$		p <0.000$^{***2)}$	

1) N.S. : Not significant by χ^2-test
2) *** : p <0.001 by χ^2-test

NAR for 9 nutrients is shown in Table 4. Among the male college students, NAR and MAR, except vitamin C were lower in the weight-control attempt group compared to those without weight-control subjects. However, among the female college students, NAR and MAR were lower in the weight-control attempt group compared to those without weight-control subjects. Phosphorous was highest, but calcium was lowest in NAR. However, iron was low in female subjects, especially the weight-control attempt group. In the case of female subjects, MAR was significantly lower in weight-control attempt group compared to those without weight-control subjects.

INQ of the subjects was higher than NAR and passed over 1 in most cases. But INQ was under 1.0 for calcium (0.95), vitamin $B_2(0.97)$ in male students of weight-control

Table 4. Nutrient adequacy ratio(NAR)[1] of subjects by weight-control attempt

	Male				Female			
	Attempt(n = 85)		Non-attempt(n = 307)		Attempt(n = 541)		Non-attempt(n = 267)	
	Mean	CV[2](%)	Mean	CV(%)	Mean	CV(%)	Mean	CV(%)
Protein	0.93	12.98	0.95*	10.34	0.95	10.48	0.96**	7.91
Calcium	0.74	29.22	0.76	27.57	0.69	28.16	0.72	27.89
Phosphorous	0.99	4.35	1.00	2.49	0.98	6.89	0.99	4.27
Iron	0.90	18.33	0.93	14.28	0.72	28.38	0.75	26.75
Vitamin A	0.89	19.09	0.92	16.35	0.87	20.30	0.91**	17.41
Vitamin B_1	0.90	16.11	0.94*	12.63	0.93	12.94	0.95*	10.31
Vitamin B_2	0.75	27.65	0.80*	22.84	0.82	21.27	0.84	20.83
Niacin	0.85	20.58	0.89*	15.49	0.91	15.20	0.93*	13.50
Vitamin C	0.93	15.97	0.92	16.26	0.91	18.01	0.92	17.45
MAR	0.87	13.56	0.90	11.63	0.86	12.38	0.89**	11.50

1) $NAR = \frac{\text{The subject's daily intake of a nutrient}}{\text{RDA of that nutrient}}$

All NAR values are truncated at 1.0
2) * : p <0.05, ** : p <0.01, *** : p <0.001 by Student's t-test
3) CV : coefficient of variation
4) MAR(Mean Adequacy Ratio) : average of NAR for 9 nutrient(protein, Ca, P, Fe, Vit. A, Vit. B_1, Vit. B_2, niacin, Vit. C)

$$MAR = \frac{\text{Sum of the NARs for 9 nutrients}}{9}$$

attempt and calcium(0.81), iron(0.89) in female students of weight-control attempt. There was no significant difference in INQ between male with and without weight-control attempt and female with and without weight-control attempt (Table 5).

Table 6 shows energy composition ratio which gets in breakfast · lunch · dinner. In both male and female students got the most energy from lunch. Male who with and without weight-control attempt obtained 366.7kcal and 407.3kcal of energy, and female who with and without weight-control attempt obtained 319.1kcal, 350.4kcal of energy from snack respectively.

Discussion

The present study was conducted to investigate the weight-control attempt reported by the subjects who were trying to manage their weight. This study has focused on dietary behaviors and health-related lifestyles.

Subjects trying to lose weight were 21.7%(n = 85) in males and 67.0%(n = 541) in females ; female students were more likely to try to lose weight compared to male students. There was a tendency that subjects with weight-control attempt had more overeating problem compared to those without weight-control attempt. Most of the male subjects had skipping breakfast and subjects with weight-control attempt had skipping meal more frequently compared to those without weight-control subjects, which did not show significant difference. In other study in Jeonbuk area of Korea(Chang, Kim 1999), skipping lunch was less common than skipping breakfast or dinner, which was similar to the result of this study. It might show that skipping meal was used as a weight-control method among female college students. In previous study in Australia(Mary 1998), for females, dieting and skipping breakfast and lunch might be connected phenomena, however, in this study weight-control attempt was associated with skipping dinner. In this study, two more 'unhealthy' restrictive practices, skipping meal and fasting, were not especially associated with weight-control attempt, and fasting was just as uncommon as has been reported in the United States(Serdula et al. 1994). In the previous studies in Korea(Choi, Jo 1999 ; Lee et al. 1996), most of reason for skipping meal was lack of time for meals. It was reported in the United States that female students with extreme weight-control attempt for thinner body image had skipping meal(Serdula et al. 1994). Breakfast affects quality of meal a day. If it is skipping breakfast,

Table 5. Index of nutritional quality(INQ)[1] of the subjects

	Male				Female			
	Attempt(n = 85)		Non-attempt(n = 307)		Attempt(n = 541)		Non-attempt(n = 267)	
	Mean	CV[2](%)	Mean	CV(%)	Mean	CV(%)	Mean	CV(%)
Protein	1.40	31.00	1.37	20.39	1.04	12.77	1.06	16.93
Calcium	0.95	28.99	0.95	28.54	0.81	27.64	0.79	24.73
Phosphorous	2.01	14.00	2.02	13.51	1.59	14.59	1.59	13.45
Iron	1.50	46.11	1.45	34.80	0.89	40.09	0.88	34.01
Vitamin A	1.56	53.73	1.48	42.34	1.21	37.61	1.23	32.20
Vitamin B_1	1.27	15.49	1.29	16.30	1.28	21.44	1.28	17.25
Vitamin B_2	0.97	25.91	1.00	21.71	1.01	29.88	0.98	22.89
Niacin	1.15	22.92	1.17	20.02	1.20	21.09	1.21	20.02
Vitamin C	1.67	43.14	1.63	49.16	1.52	54.01	1.53	51.26

1) $INQ = \frac{\text{Amount of nutrient in 1000kcal of food or diet}}{\text{RDA of per 1000kcal}}$

2) CV : Coefficient of variation

Table 6. Distribution of energy composition

	Male		Female	
	Attempt(n = 85)	Non-attempt(n = 307)	Attempt(n = 541)	Non-attempt(n = 267)
Composition of energy by meal(%) Breakfast : Lunch : Dinner	22.5 : 40.3 : 37.2	24.1 : 39.5 : 36.4	26.5 : 38.1 : 35.4	24.5 : 38.0 : 37.5
Energy from snack(g)	366.7	407.3	319.1	350.4

nutrient intake is not filled with other meals, thus nutrient intake amount of a day is decreased(Al-Attar 1987). Therefore, nutrition education about the importance of breakfast is necessary for improvement of eating behavior. In this study, nearly half of the subjects had irregular meal. It may be due to that they escaped regular life in high school and entered to the college, and then had irregular meal suddenly as having free life. This result of meal speed was similar to the result that 10 - 20 minutes was most in other studies(Al-Attar 1987 ; Choi, Jo 1999 ; Park, Choi 1998). The subjects with weight-control attempt ate snack more frequently than subjects without weight-control attempt. Morning was the least common time of day for their eating snack. This is considered that subjects with weight-control attempt ate snack more frequently to fill empty stomach because meal number of those with weight-control attempt was less than those without weight-control attempt.

In this study, there was a significant difference in score on dietary attitudes between female subjects with and without weight-control attempt. This subjects showed more positive attitudes than college students at Chungbuk area in Korea(Kim, Lee 1996), but less positive than university woman students in Seoul(Kim et al. 1999).

In previous study conducted in Deajeon metropolitan area of Korea(Lee, Woo 1999), as for self-reported health status, 47.8% of college students answered 'little good' and 26.7% did 'very good'. In another study in Taegu metropolitan area of Korea, 92.2% of male college students answered 'healthy' and 77.2% of female college students answered 'healthy'(Choi, Jo 1999). As for frequency of exercise in previous study conducted in Busan metropolitan area of Korea(Lee 1999), it was 'every day' 38.2%, did 'almost never' 5.5%, and it was higher compared to data of this study. In previous study conducted in Taegu and Kyungbuk area of Korea(Park, Choi 1998), female college students with weight-control attempt had exercise more often compared to those without weight-control attempt, which seemed similar to result of this study. Among male and female college students, trying to lose weight was associated with exercise. Exercise in female college students who were trying to lose weight seems to be a method of weight control. Female college students view exercise as a means of changing weight.

Because intake of energy is influenced by structure of body, degree of physical activity, metabolism efficiency, and overall energy balance(Willett, Stampfer 1986), difference between individuals appears greatly. Nutrient intake and energy intake usually show strong positive correlation (Jeguier, Schutz 1984). Therefore, difference in energy intake is necessary for individual when subjects assess quality of meal. In previous study conducted in the United States (Murphy et al. 1992) showed low NAR of 0.73 - 0.83 in the 1987 - 88 Nationwide Food Consumption Survey. In this study, NAR of male and female college students was high compared to data in Taegu metropolitan area of Korea (Choi, Jo 1999). Nutritional adequacy, one aspect of dietary quality, was measured by MAR, an index of the percent of recommended intake for nutrients. More nutrients than those represented by MAR are needed to maintain good health. Evaluating dietary adequacy of males and females in the United States(Murphy et al. 1992) showed lower MAR than was shown in this study.

INQ compares energy content of meal and nutrient content ratio to nutrient recommended amount. If index of nutritional quality of any nutrient is 1 as satisfying the energy recommend amount, intake of the nutrient can satisfy the recommended amount. In case of this subject whose energy intake itself is low, INQ was calculated to see whether other nutrient intake can improve enough, if their energy intake is enough. In previous study conducted in the USDA Nationwide Food Consumption Survey(NFCS : 1977 - 1978)(Windham et al. 1983) showed all most nutrient over 1 expect calcium intake of 0.89, iron intake of 0.86, magnesium intake of 0.91, vitamin B_6 intake of 0.79. In this study, INQ of male and female college students was higher compared to data in Taegu metropolitan area of Korea(Choi, Jo 1999).

Summary and Conclusion

In order to investigate the difference in dietary attitudes, dietary behaviors and health-related lifestyles among Korean college students participating in a web class of nutrition education, the cross-sectional study was carried out using a self-administered questionnaire from May 1 to May 31, 2000. The subjects were 1200 healthy college students from males(n = 392) and females(n = 808) which participated in a nutrition education class via the internet. The subjects were divided into two subgroups by weight-control attempt ; subjects with or without weight-control attempt.

The results are as follows :

1) Subjects trying to lose weight were 21.7%(n = 85) in males and 67.0%(n = 541) in females.

2) Most subjects with weight-control attempt had eating habit problems such as overeating, skipping meal and food jags. The female subjects with weight-control attempt showed significantly higher rate of skipping dinner compared to those without weight-control attempt. There was a significant difference in reason of skipping meal between male subjects with and without weight-control attempt ; 32.1% of those with weight-control attempt answered 'lack of the time for meals', 22.6% did 'habitual', and 17.9% did 'oversleeping' and 37.2% of those without weight-control attempt did 'lack of the time for meals', 22.8% did 'oversleeping', 16.8% did 'no appetite', 16.8% did 'habitual'. There was a significant difference in reason of skipping meal between female subjects with and without weight-control attempt ; 45.7% of those with weight-control attempt answered 'lack of time for meals', 15.2% did 'weight loss', and 13.5% did 'habitual' and 51.0% of those with weight-control attempt did 'lack of the time for meals', 14.8% did 'habitual', and 13.3% did 'oversleeping'.

3) There was a significant difference in score of dietary attitudes between male subjects with and without weight-control attempt ; scores of those with and without weight-control attempt were 23.2 and 22.9 out of 33, respectively. There was a significant difference in score of dietary attitude between female subjects with and without weight-control attempt ; scores of those with and without weight-control attempt were 23.5 and 23.1, respectively.

4) As for frequency of exercise, the subjects with weight-control attempt exercised more frequently compared to those without weight-control attempt. There was no significant difference in frequency of exercise between male subjects with and without weight-control attempt ; 31.8% of those with weight-control attempt answered 'everyday', 25.9% did 'twice a week', and 20.0% did 'once a week', and 25.1% of those without weight-control attempt did 'once a week', 24.1% did 'twice a week', and 22.5% did 'everyday'. There was a significant difference in frequency of exercising between female subjects with and without weight-control attempt ; 34.2% of those weight-control attempt answered 'none', 20.9% did 'twice a week', and 17.2% did 'once a week', and 54.3% of those without weight-control attempt did 'none', 16.1% did 'once a month', and 13.5% did 'once a week'.

5) Among the male college students, NAR and MAR, except vitamin C were lower in the weight-control attempt group compared to those without weight-control subjects. And among the female college students, NAR and MAR were lower in the weight-control attempt group compared to those without weight-control subjects.

6) Male who with and without weight-control attempt obtained 366.7kcal and 407.3kcal of energy, and female who with and without weight-control attempt obtained 319.1 kcal, 350.4kcal of energy from snack respectively.

In conclusion, the present results showed that the skipping dinner and exercise are highly prevalent among Korean college female students participating in a nutrition education class via the internet. It is important for the students to improve their dietary attitudes, dietary behaviors and overall dietary intakes. Nutrition education for Korean college students with weight-control attempt is needed to improve their dietary attitudes, which will eventually assist them in improving their intakes of nutrients.

References

Al-Attar AA(1987) : Studies into food consumption patterns of university student community of Irap : 1. consumption pattern of basic food groups and consequent nutrient intake. *Nur Rep Int* 35(3) : 505-515

Brevard PB, Ricketts CD(1996) : Residence of college students affects dietary intake physical activity, and serum lipid levels. *J Am Diet Assoc* 96 : 35-38

Chang HS, Kim MR(1999) : The change on food habits of girls students living in Jeonbuk region. *Kor J Comm Nutr* 4(3) : 366-374

Choi MJ, Jo HJ(1999) : Studies on nutrient intake and food habit of college students in Taegu. *Korean J Nutr* 32(8) : 918-926

Choi MK, Jun YS, Park MK(2000) : A study on eating patterns and nutrient intakes of college students by residences of self-boarding and home with parents in Chungnam. *J Korean Diet Assoc* 6(1) : 9-16

Hansen RG(1973) : An index of food quality. *Nutr Rev* 31 : 1

Jeguier E, Schutz Y(1984) : Long-term measurement of energy expenditure in humans using a respiratory chamber. *Am J Clin Nutr* 39 : 152-156

Jacobson MS(1995) : Nutrition in adolescence. *Annales Nestle* 53 : 106-114

Kim SYS, Gergen PJ, Malloy M(1995) : Dietary patterns of U.S children : Implication for disease prevention. *Prev Med* 19 : 432-442

Kim KA, Kang HJ, Kim KW(1999) : A study of weight control attempt, psychosocial status, nutrition behavior and related

factors among female university students. *Kor J Comm Nutr* 1(2) : 108-118

Kim KN, Lee KS(1996) : Nutrition knowledge, dietary attitudes, and food behaviors of college students. *Kor J Comm Nutr* 1(1) : 89-99

Kim KW, Lee MJ, Kim JH, Shim YJ(1998) : A study on weight control attempt and related factors among college female students. *Kor J Comm Nutr* 3(1) : 21-33

Kim WY(1984) : Nutrition knowledge and food habits of college students. *Korean J Nutr* 17(3) : 178-184

Kwon WJ, Chang KJ(2000) : Evaluation of nutrient intake, eating behavior and health-related lifestyle of Korean college students. *Nutr Sci* 3(2) : 89-97

Lee JY(2000) : A study on anthropometric measurement, health condition and nutritional status of female college students in Kyunggido area. *J East Asian Soc Dietary Life* 10(5) : 372-386

Lee KA(1999) : A comparison of eating and general health practices to the degree of health consciousness in Pusan college students. *J Korean Soc Food Sci Nutr* 28(3) : 732-746

Lee YN, Lee JS, Ko YM, Woo JS, Kim BH, Choi HM(1996) : Study on the food habits of college students by residences. *Kor J Comm Nutr* 1(2) : 189-200

Lee MS, Woo MK(1999) : Changes in food habit, nutrition knowledge and nutrition attitude of university students during nutrition course. *Korean J Nutr* 32(6) : 739-745

Mary ES(1998) : Adolescent breakfast skipping : an Australian study. *Adolescence* 33(132) : 851-861

Murphy SP, Rose D, Hudes M, Viteri FE(1992) : Demographic and economic factors associated with dietary quality for adults in the 1987-88 Nationwide Food Consumption Survey. *J Am Diet Assoc* 92(11) : 1352-1357

Park MH, Choi YS(1998) : A survey on weight control diets practiced by college women in Taegu and Kyung Buk. *J of Korean Diet Assoc* 4(2) : 200-211

Park HS, Lee HO, Sung CJ(1997) : Body image, eating problems and dietary intakes among female college students in urban area of Korea. *Kor J Comm Nutr* 2(4) : 505-514

Schlenker ED(1984) : Nutrition in aging, pp.24-14, Times Mirror/ Mosby. St. Louis

Serdula MK, Williamson DF, Anda RF, Levy A, Heaton A, Byers T (1994) : Weight control practices in adults : result of a multistate telephone survey. *Am J Public Health* 84 : 1821-1824

Willett WC, Stampfer MJ(1986) : Total energy intake : Implications for epidemiologic analyses. *Am J Epidemiol* 124 : 17-27

Windham CT, Wyse BW, Hanses G(1983) : Nutrient density of diets in the USDA Nationwide Food Consumption Survey, 1977-1978 : 2. Adequacy of nutrient density consumption practices. *J Am Diet Assoc* 82(1) : 34-43

Won HR(1998) : A study of the relationship between the eating attitude influenced by eating disorder and body shape, nutritional knowledge among female college students in Wonju province. *Kor J Comm Nutr* 3(2) : 308-316

You JS, Chang KJ, Byun KW(1994) : A study on nutrient intake of college students. *J of Korean Home Economics Association* 32(4) : 209-216