An analysis of body composition, caloric intake and consumption patterns of Korean college students

Me-Suk Kim[1], Yu-Mi Won[2], Se-Won Jung[2], Hee-Je Choi[2], Tae-Young Kim[2],
Tae-Gyeom Jung[3]*

[1]College of Convergence Culture and Arts, Sungshin Women's University,
2 Bomun-ro, 34 Da-gil, Seoul 028444, Korea
[2]College of Education, Hankuk University of Foreign Studies,
107 Imun-ro,Dongdaemun-gu, Seoul 02450, Korea
[3]College of Physical Education, Kyunghee University,
1732 Deogyeong-daero, Giheung-gu, Yongin-si, Gyeonggi-do 17104, Korea
[1]mshb0320@naver.com, [2]ktyoung66@hanmail.net, [3]halsee@khu.ac.kr

Abstract

Recently, Korean college students are experiencing hardships due to their irregular eating habit. As their dietary and calorie-consuming patterns are neither consistent nor regular in particular, this research was conducted in need for an empirical study regarding them. The study chose convenience sampling method and asked 200 Korean male and female college students to self-report their caloric intake and consumption calories. Then, the caloric intakes were analyzed with CAN-Pro 4.0, and burnt calories were analyzed by recording the actual physical activities the students carried out. For the statistics, SPSS ver 18.0 was used; here the average, stand deviation, and cross-tabulation analysis (x2) were calculated. For both male and female students, the numbers were revealed to be high in the consumption calorie groups. The research concludes that the group with the adequate body composition in line with the Korean students' nutritional intake and consumption calorie was the one that had three meals a day; the intake calorie of male students that had two meals a day rather than three was found out to be higher than that of the female counterpart. In addition, the groups that had three meals a day turned out to be doing more physical activities; therefore, it is very important that the students try to have meals three times a day on a regular basis, rather than choosing to develop a habit of having meals irregularly.

Keywords: college students, intake, consumption, calorie

Introduction

This research was conducted to study dietary patterns of Korean college students. In Korea, students experience fierce competition during their middle and high school periods to enter prestigious universities; once they successfully get into the university, still, they once again intensely compete for decent jobs. Therefore, even though it is recommended to have regular meals and physical activities while the students are studying in universities, it is very difficult for them to follow it in their daily lives. If such irregular patterns are protracted, it will ultimately give bad influence on their bodies, plus make them vulnerable to diseases as the physical strength weakens. Irregular dietary habit rapidly increases blood sugar level right after the meal, and is known to raise the prevalence of metabolic syndromes and diabetes, along with increased risk of cardiovascular disorders even for those without diabetes.

The rapid economic and industrial advancement in Korea has brought about immense change in people's dietary patterns. Development of the food industry and people's preference for convenience led to increased consumption of easy-to-cook food products [1]. The recent rise in the number of convenience stores that are open 24 hours a day is encouraging people to easily purchase instant food that do not consider nutritional ingredients [2, 3]. In a general experiment on animals, when the animals were intermittently fed with high calorie feed, they showed similar symptoms and neuro-chemical reactions to drug abuse. In a study with 292 college students in Chile, the scientists used Yale Food Addiction Scale to see nutritional conditions and prevalence of diseases related to diet. The figures were higher in the high-BMI group; women showed higher figures than men [4]. In addition, an experiment was conducted with 77 Spanish college students, and the researchers asked the students to record the amount of food they have while pursuing Mediterranean style diet for a week using the software Nutriber (version 1.1.1 3r) to measure the amount of calories they took. As a result, they lacked vitamins and minerals as they took fewer calories than the recommended amount [5]. Moreover, freshmen in the United States [6] and Britain [7, 8] saw an increase in their body weight resulting in overweight, making students unsatisfied with their physical condition. This triggered female students to attempt going on a diet in various forms [9, 10].

This research aims to help Korean college students to live healthy college life by suggesting a right way of eating with accurate analysis on their dietary patterns.

Methods

1. Subject selection

Final analysis was done with a total number of 200 participants: 100 male and 100 female, aged between 20 and 33. BMI was calculated based on the height and weight of the subject, and each was asked to fill out a survey about caloric intake and physical activities to check the dietary pattern. The subjects wrote the types and amount of food they ate for three days.

2. Measurement procedure

Sociodemographic characteristics were measured by age and gender, and the subjects were divided into two based on the BMI result: obese and non-obese (Table 1). Then, they were subdivided into 9 different types depending on their calorie-intake patterns (Table 2). nd the group with high caloric intake was done.

T a b l e 1 . Normal and overweight groups categorized based on the BMI values.

BMI		operational definition
Category	Men	
Underweight	18.5 and less	1(Normal)
Normal weight	18.5 to 24.9	
Pre-obese	25.0 to 29.9	2(Overweight)
Obese class I	30.0 to 34.9	
Obese class II	35.0 to 39.9	
Obese class III	Above 40	

BMI (World Health Organization, 2016)

T a b l e 2 . Caloric intake groups categorized based on the subjects' daily meals taken.

Category	Operational definition
Breakfast + Lunch	Type 1
Breakfast + Dinner	Type 2
Lunch + Dinner	Type 3
Dinner + Snack	Type 4
Breakfast + Lunch + Dinner + Snack	Type 5
Breakfast + Dinner + Snack	Type 6
Lunch + Dinner + Snack	Type 7
Dinner	Type 8
Breakfast + Lunch + Dinner	Type 9

Results

1. Differences among BMI, BMR, gender, and separate calorie, based on the groups of different intake patterns.

2. Differences among high calorie consumption group, high caloric intake group, BMI, BMR, and gender.

Discussion

To identify dietary and consuming patterns of Korean college students both male and female, this research calculated BMI levels. With the result, the paper categorized the subjects into underweight, normal, and overweight (obese). Also, to distinguish food-related dietary patterns, the paper categorized all the possible ways of having meals a day into 9 types, depending on whether the person had breakfast, lunch, dinner, or snacks.

In terms of dietary patterns on the basis of BMI, a significant difference was found between those with normal weight and those overweight. The normal weight subjects did not grow body weight or body fat as they divided breakfast, lunch, and dinner in a balanced way, however, those overweight did not do the same; they overate during lunch or dinner, thereby decreasing energy metabolic ability that led to an imbalance in metabolism. This resulted in the increase in body weight and body fat. According to a preceding research, maintaining a healthy diet and comprising healthy menus for a meal are beneficial in that they prevent a person from binge-eating and help effectively lose body fat [11, 12].

Therefore, as a strategy to lose body fat and not become require , and set up a food plan in accordance with it.

T a b l e 3 . Differences among BMI, BMR, gender, and calorie depending on the intake patterns.

		Intake pattern (N)									Sum	χ^2
		1	2	3	4	5	6	7	8	9		
BMI	Normal	4	3	18	6	46	10	35	1	11	134	
	Overweight	2	3	4	0	15	3	24	2	13	66	16.429*
	Sum	6	6	22	6	61	13	59	3	24	200	
BMR (calorie)	1200	1	0	0	0	4	0	0	0	0	5	
	1300	0	0	4	4	21	6	12	0	2	49	
	1400	2	2	5	2	13	3	11	0	2	40	
	1500	1	1	0	0	4	0	6	1	1	14	
	1600	0	0	2	0	4	0	4	0	1	11	
	1700	1	1	2	0	6	3	6	1	5	25	
	1800	0	1	4	0	1	1	7	0	7	21	
	1900	0	1	3	0	4	0	5	0	3	16	106.418
	2000	0	0	1	0	1	0	3	1	1	7	
	2100	0	0	0	0	2	0	2	0	2	6	
	2200	1	0	0	0	1	0	1	0	0	3	
	2300	0	0	1	0	0	0	0	0	0	1	
	2400	0	0	0	0	0	0	1	0	0	1	
	2500	0	0	0	0	0	0	1	0	0	1	
	Sum	6	6	22	6	61	13	59	3	24	200	

		1	2	3	4	5	6	7	8	9	Sum	χ^2
Sex	Male	2	4	15	0	21	6	30	3	19	100	
	Female	4	2	7	6	40	7	29	0	5	100	27.421***
	Sum	6	6	22	6	61	13	59	3	24	200	
Separate calorie	Calorie Consumption	3	4	13	3	48	10	36	2	11	130	
	Caloric intake	3	2	9	3	13	3	23	1	13	70	11.659
	Sum	6	6	22	6	61	13	59	3	24	200	

*p<.05 **p<.01 ***p<.001

1= Breakfast + Lunch, 2=Breakfast + Dinner, 3=Lunch + Dinner, 4=Dinner + Snack, 5=Breakfast + Lunch + Dinner + Snack, 6=Breakfast + Dinner + Snack, 7=Lunch + Dinner + Snack, 8=Dinner, 9=Breakfast + Lunch + Dinner

Regarding the dietary pattern upon BMR, there were no significant differences among the nine categories; there were 89 students (44.5%) placed between 1300 and 1400 calories, and 62 students (31%) placed between 1700 and 1900 calories – the ranges in which the subjects were mostly concentrated. Recommended daily requirements for an adult in his or her 20s in Korea are 2000 and 2500 calories, for female and male respectively. However, the actual amount of calories taken after using the CAN-Pro 4.0 program was far below the advisable amount. The reasons for this may be the reality of Korean college students where they have only one or two meals a day irregularly, and enjoy too much snacks. Therefore, a practical education has to be carried out about how effective nutrients a balanced diet composed of three major nutrients – carbohydrate, fat, and protein – can bring to the body. In regards of a dietary pattern depending on gender, there was a

T a b l e 4 . Differences among high calorie consumption group, high caloric intake group, BMI, BMR, and gender.

		Separate Calorie {N(%)}		Total	χ^2
		Calorie Consumption	Caloric Intake		
BMI	Normal	105(52.5%)	29(14.5%)	134(67.0%)	
	Overweight	25(12.5%)	41(20.5%)	66(33.0%)	31.850***
	Sum	130(65.0%)	70(35.0%)	200(100%)	
BMR (calorie)	1200	4(2.0%)	1(0.5%)	5(2.5%)	
	1300	43(21.5%)	6(3.0%)	49(24.5%)	
	1400	26(13.0%)	14(7.0%)	40(20.0%)	
	1500	8(4.0%)	6(3.0%)	14(7.0%)	
	1600	9(4.5%)	2(1.0%)	11(5.5%)	
	1700	16(8.0%)	9(4.5%)	25(12.5%)	
	1800	10(5.0%)	11(5.5%)	21(10.5%)	
	1900	10(5.0%)	6(3.0%)	16(8.0%)	38.714***
	2000	3(1.5%)	4(2.0%)	7(3.5%)	
	2100	0(0.0%)	6(3.0%)	6(3.0%)	
	2200	0(0.0%)	3(1.5%)	3(1.5%)	
	2300	1(0.5%)	0(0.0%)	1(0.5%)	
	2400	0(0.0%)	1(0.5%)	1(0.5%)	
	2500	0(0.0%)	1(0.5%)	1(0.5%)	
	Sum	130(65.0%)	70(35.0%)	200(100%)	
Sex	Male	56(28.0%)	44(22.0%)	100(50%)	
	Female	74(37.0%)	26(13.0%)	100(50%)	7.121**
	Sum	130(65.0%)	70(35.0%)	200(100%)	

**p <.01 ***p<.001

significant difference between male and female college students. Out of 200 students in total, 22 students (11%) had lunch and dinner, and 24 students (12%) had all three meals a day, which were relatively high. Also, the most common dietary pattern of the male and female college students was having three meals, plus some snacks; 61 students (31.5%), and 59 students (29.5%) only had lunch, dinner, and snacks.

In terms of consumption and intake of calories upon BMI, subjects with normal BMI figures had more calories consumed overweight, one should calculate the calories their body than those taken, while overweight subjects showed vice versa. A related preceding research was done with 180 Saudi Arabian students, in which the researchers surveyed activities of students that had more caloric intake compared to calories

consumed. It showed that the students mostly spent time sedentarily to watch TV programs or play computer games thereby lessening the amount of energy needed as a whole, leading to an increase in BMI and body fat [13].

It was found to have a significant difference between consumption calories and caloric intake upon BMR; consumption calories were more distributed in the caloric range from 1300 to 1400, while caloric intake was more spread in the 1400s and 1800s. BMR was low in both male and female students, possibly because students did not do regular exercises. Generally, when a person does physical activities on a regular basis, the amount of protein that maintains muscle increases, raising the BMR level.

In an experiment with adults, when the subjects were given various types of menus, with more physical movements, their BMR increased while the body fat dropped [14]. Also, after carrying out a 12-week workout at a cycle ergometer, the subject, an obese female adult, experienced increased BMR and a fall in body fat and trigiyceride [15]. In addition, another experiment was carried out for obese adolescents; they went through three weeks of intense (70%) and mild (40%) level of exercises. As a result, after the mild level exercise, their body weight and fat decreased, and BMR rose [16]. As such, for college students, to improve BMR, it is more recommended that they walk more than 30 minutes a day faster than their normal walking pace, rather than doing intense workouts.

Looking at the caloric intake and consumption depending on gender, female students showed higher consumption calories than male students with figures of 74 females (37%) to 56 males (28%), however, in terms of caloric intake, the figures of female students were lower than male students with 26(13.5%) and 44(22%) students respectively. Generally, female students in Korea were found to be passionate about losing weight, in a wrong way, as they reduce the amount of calories they eat, and rarely do physical activities. When conducting a research on college students' dietary pattern, sophisticated research on consumption calories and caloric intake is important indeed, however, promoting balanced diet through regular physical activities has to be done prior to it.

Conflicts of Interest: The authors declare no conflict of interest.

References

[1] Jang EJ, Lee JH, Lee SJ, Kim MH. Short-Term Effect of Convenience Meal Intake on Glycemic Response and Satiety among Healthy College Students in South Korea. *Clin Nutr Res.* 2017;6(3):215–220.

[2] Lee KA, Cho EJ, Yoon HS. A study on consumption of convenience foods of university students by residing types in Changwon and Masan area. *J Korean Diet Assoc.* 2010;16:279–290.

[3] Kim SJ, Bu SY, Choi MK. Preference and the frequency of processed food intake according to the type of residence of college students in Korea. *Korean J Community Nutr.* 2015;20:188–196.

[4] Obregón A, Fuentes J, Pettinelli P. Association between food addiction and nutritional status in Chilean college students. *Rev Med Chil.* 2015 May;143(5):589-597.

[5] Pérez-Gallardo L, Mingo Gómez T, Bayona Marzo I, Ferrer Pascual MÁ, Marquez Calle E, Rámirez Domínguez R, Navas Ferrer C, Navas Cámara F.Diet quality in college students with different academic profile. *Nutr Hosp.* 2015 May 1;31(5):2230-2239.

[6] Crombie AP, Ilich JZ, Dutton GR, Panton LB, Abood DA. The freshman weight gain phenomenon revisited. *Nutr Rev.* 2009;67:83–94.

[7] Finlayson G, Cecil J, Higgs S, Hill A, Hetherington M. Susceptibility to weight gain. Eating behaviour traits and physical activity as predictors of weight gain during the first year of university. *Appetite. 2012;58:1091–1098 Available from: http://www.ncbi.nlm.nih.gov/pubmed/22407132. [cited* 2012 Nov 29].

[8] Nikolaou CK, Hankey CR, Lean MEJ. Weight changes in young adults : a mixed-methods study. Int J Obes. 2014;39:508–513.

[9] Neumark-Sztainer D, Wall M, Larson N, Eisenberg M, Loth K. Dieting and disordered eating behaviors from adolescence to young adulthood: findings from a 10-year longitudinal study. *J Am Diet Assoc.* 2011;111:1004–1011.

[10] Fayet F, Petocz P, Samman S. Prevalence and correlates of dieting in college women: a cross sectional study. *Int J Womens Health.* 2012;13:405–411.

[11] Samaha FF[1], Iqbal N, Seshadri P, Chicano KL, Daily DA, McGrory J, Williams T, Williams M, Gracely EJ, Stern L. A low-carbohydrate as compared with a low-fat diet in severe obesity. *N Engl J Med.* 2003, 22;348(21):2074-2081.

[12] Sacks FM, Bray GA, Carey VJ, Smith SR, Ryan DH, Anton SD, McManus K, Champagne CM, Bishop LM, Laranjo N, Leboff MS, Rood JC, de Jonge L, Greenway FL, Loria CM, Obarzanek E, Williamson DA. Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates. *N Engl J Med.* 2009, 26;360(9):859-73.

[13] Alghadir AH, Gabr SA, Iqbal ZA: Effects of sitting time associated with media consumption on physical activity patterns and daily energy expenditure of Saudi school students. *J Phys Ther Sci,* 2015, 27: 2807–2812.

[14] Bonfanti N, Fernández JM, Gomez-Delgado F, Pérez-Jiménez F. Effect of two hypocaloric diets and their combination with physical exercise on basal metabolic rate and body composition. *Nutr Hosp.* 2014; 1;29(3):635-43.

[15] Botero JP[1], Prado WL, Guerra RL, Speretta GF, Leite RD, Prestes J, Sanz AV, Lyons S, de Azevedo PH, Baldissera V, Perez SE, Dâmaso A, da Silva RG. Does aerobic exercise intensity affect health-related parameters in overweight women?. *Clin Physiol Funct Imaging.* 2014;34(2):138-142.

[16] Lazzer S, Lafortuna C, Busti C, Galli R, Agosti F, Sartorio A. Effects of low- and high-intensity exercise training on body composition and substrate metabolism in obese adolescents. *J Endocrinol Invest.* 2011 Jan;34(1):45-52.