



Applied nutritional investigation

Academic stress levels were positively associated with sweet food consumption among Korean high-school students

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ABSTRACT

Objective: The objectives of the present study were to identify the association among levels of persistent academic stress, appetite, and dietary habits and to determine the specific types of sweet foods consumed by Korean high-school students according to their academic stress levels. **Methods:** The study participants included 333 high-school students in the 10th to 12th grades in Kyunggi Province, Korea. The level of academic stress was scored with a 75-item academic stress scale and was categorized as high, medium, or low. A food-frequency questionnaire was used to measure the sugar intake from sweet foods.

Results: Korean high-school students with a high academic stress level had larger meals than the other students. Compared with students with low academic stress, the students with high academic stress had a higher frequency of sugar intake from the following food types: confectionaries, candies and chocolates, breads, and flavored milk. Moreover, compared with students with low academic stress, the students with high academic stress had a higher total intake of sugar from the following food types: confectionaries, candies, chocolates, flavored milk, traditional Korean beverages, and spicy, sweet, and fried rice cakes.

Conclusion: Unhealthy stress-related food choices may compromise high-school students' health and contribute to their morbidity. The findings of the present study could be used to help nutritionists develop effective strategies for nutritional education and counseling to improve adolescent health.

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Introduction

Adolescence is a critical period for growth and development, so adolescents need a healthy, balanced diet to meet their increased demands for energy and nutrients [1]. The importance of healthy eating habits during adolescence has been emphasized to prevent and decrease the incidence of diet-related chronic disease later in life [1]. Despite the importance of nutritional health during adolescence, adolescents have adopted a high-fat, high-sugar diet with a limited intake of fruits and vegetables [2]. Various individual influences are known to be major barriers to healthy eating patterns, including a taste preference for high-sugar and high-fat foods, the convenience of less healthy foods, limited time and availability to consume

healthy foods, stress, a social environment lacking support from parents, the school environment, and the mass media [3,4].

In addition to unhealthy eating habits, adolescents have extreme stress owing to academic and social demands in high school, especially in Korea. Korean adolescents are under intense academic pressure because of the competitive college entrance examination. This nationwide college entrance examination is administered only once a year. Entering and graduating from a high-ranking university in Korea means a greater chance of obtaining a good job with high wages, a high social status, and a good spouse with a high salary and high social status [5]. In 2011, results of the Shanghai Academy of Social Science showed that Korean high-school students spent as many as 14 to 18 h/d studying at school and private tutoring institutes [6]. Many students use private tutoring to devote every minute to prepare for the comprehensive college examination [6]. A very well-known saying in Korean 12th graders is “sleep four hours pass,

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sleep five hours fail," which refers to the number of hours of sleep allowable during the examination preparation [5]. In 2010, 7 of 10 Korean high-school students responded that they had been stressed because of academic demands. The top reason for wanting to commit suicide (54%) was the pressure and anxiety related to academic performance, including high academic expectations, academic workload, and academic competition among peers [7].

Numerous studies have shown that the level of psychological stress results in changes in food-intake patterns, including the amount and types of food chosen [8–11]. An increased intake of energy-dense foods containing high fat or sugars has been observed under stressful conditions [10,11]. Wansink et al. [12] reported different comfort-food preferences across different ages and genders. Male subjects preferred warm, meal-type comfort foods, whereas female subjects preferred more snack-related comfort foods. Moreover, younger adults preferred more snack-related foods than those older than 55 y [12].

Although previous studies [8,11] have shown that people increase their intake of sweet foods during persistently stressful situations, to date, no study has specifically examined which types of sweet foods are increased. Furthermore, research is limited regarding individual differences in coping with persistent academic stress through eating behaviors. The objectives of the present study were to identify the relations among persistent academic stress, appetite, and dietary habits, and the intake of specific types of sweet foods in Korean high-school students. In the present study, it was hypothesized that high academic stress in Korean high-school students would be positively related to a more frequent and a higher intake of sweet foods.

Materials and methods

Subjects

The study participants were recruited through their high schools, which agreed to the students' participation after the study was advertised by the Kyunggi Provincial Office of Education. This cross-sectional study recruited 385 high-school students from grades 10 through 12 in Kyunggi Province, Korea. A total of 333 students (202 boys and 131 girls) completed the study. The study was deemed exempt by the Kyung Hee University institutional review board (Seoul, Korea). Informed consent was obtained from all participants before the start of the study. This study followed Good Clinical Practice guidelines.

Questionnaire

The questionnaire consisted of four different categories: 1) demographic information, such as gender, age, parents' educational background, and household income; 2) a 75-item academic stress scale; 3) dietary habits; and 4) a 28-item food-frequency questionnaire to measure sugar intake.

The 75-item academic stress scale, developed and validated by Kim et al. [13], was used to measure the extent of academic stress, concern, and anxiety across three subscales: school-related factors, inter-personal relationships, and academic stress. The school-related factors subscale included 35 items on stress-related academic performance, tests, taking classes, and studying. The inter-personal relationships subscale consisted of 19 items on relationships with teachers, family members, and friends. The academic stress subscale consisted of 21 items on physical, psychological, and behavioral symptoms of stress. For the academic stress scale, the participants were asked to indicate the extent to which they had experienced stress over the previous week. It was a self-reported measurement using a 5-point severity Likert scale from 1 (not at all) to 5 (applied strongly to me), and the item responses were summed.

Participants were assigned to one of three groups based on the total scores on the academic stress scale. Students with the highest tertile of total scores on the academic stress scale were categorized as the high academic stress group, students with the second highest tertile were categorized as the medium academic stress group, and the remaining students who had the lowest tertile of total scores were categorized as the low academic stress group.

Questions regarding dietary habits involved dietary practices, such as changes in meal size, appetite, eating speed, and taste preference under stress. Participants were asked to report their intake of sweet foods over the previous

month on a food-frequency questionnaire, which was developed and validated by Sim et al. [14]. The food-frequency questionnaire for sweet food intake was used to measure the sugar intake of high-school students during stressful conditions. To determine the frequency of intake, students were asked to select one of nine categories, ranging from never or less than once a month to at least three times per day. Moreover, to measure the amount of intake of each food item, the students were asked to select one of three categories, ranging from smaller than a specified serving size to larger than a specified serving size. For each food item, the participants indicated their average frequency and amount of consumption over the previous month.

The Korean food composition database was used to convert food intakes to nutrient values. A list of total sugar contents in sweet foods [15] was used to calculate the sugar amounts.

Statistical analyses

All analyses were performed with SPSS 12.0 (SPSS, Inc., Chicago, IL, USA). Data were presented as mean \pm standard deviation. Descriptive statistics were used to report the subjects' average age and gender. The chi-square test was used to determine relations among academic stress level, academic performance, and changes in dietary habits under stress. Analysis of variance was conducted to test for the global significant differences in the total amount of sugar intake from sweet foods by academic stress level and the differences in the frequency of sugar intake from sweet foods by academic stress level. If the global results of analysis of variance were significant, a post hoc analysis with the Duncan multiple range test was used to perform pairwise comparisons. Age- and sex-adjusted Spearman partial correlation coefficients were used to evaluate the association between the daily frequency or the daily amount of sugar intake and the academic stress scale scores in Korean high-school students. The results were considered statistically significant only if the *P* value of an analysis was less than 0.1.

Results

The mean age of the 333 participants (202 boys and 131 girls) who completed the study was 17.4 ± 1.2 y. The mean score on the academic stress scale was 190.5 ± 37.8 . Two-thirds of the participants' parents (67.3%) were college educated, and approximately half (49.2%) of the participants' net monthly household income was higher than \$3500.

School life satisfaction, class rank, grade point average satisfaction, and perceived stress are presented in Table 1 according to the students' academic stress level. School life satisfaction was significantly different according to the academic stress level ($P = 0.001$). Approximately one-fourth (27%) of participants with

Table 1
School life according to academic stress levels

	Academic stress level			Total	<i>P</i>
	High	Medium	Low		
School life satisfaction					0.001
Very dissatisfied	5 (4.5)	2 (1.8)	1 (0.9)	8 (2.4)	
Dissatisfied	25 (22.5)	12 (10.8)	10 (9.0)	47 (14.1)	
Neutral	49 (44.1)	54 (48.6)	39 (35.1)	142 (42.6)	
Satisfied	27 (24.3)	32 (28.8)	41 (36.9)	100 (30.0)	
Very satisfied	5 (4.5)	11 (9.9)	20 (18.0)	36 (10.8)	
Class rank					0.001
Very high	7 (6.3)	15 (13.5)	29 (26.1)	52 (15.3)	
High	29 (26.1)	36 (32.4)	32 (28.8)	97 (29.1)	
Middle	46 (41.4)	42 (37.8)	38 (34.2)	126 (37.8)	
Low	29 (26.1)	18 (16.2)	12 (10.8)	59 (17.7)	
Grade point average satisfaction					<0.001
Very dissatisfied	42 (37.8)	30 (27.0)	20 (18.0)	92 (27.6)	
Dissatisfied	48 (43.2)	53 (47.7)	40 (36.0)	141 (42.3)	
Neutral	16 (14.4)	20 (18.0)	30 (27.0)	66 (19.8)	
Satisfied	5 (4.5)	6 (5.4)	15 (13.5)	26 (7.8)	
Very satisfied	0 (0)	2 (1.8)	6 (5.4)	8 (2.4)	
Perceived stress					<0.001
Yes	107 (96.4)	90 (81.1)	79 (71.1)	276 (81.9)	
No	4 (3.6)	21 (18.9)	32 (28.8)	57 (17.1)	

Values are presented as number (percentage).

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