Meal skipping relates to food choice, understanding of nutrition labeling, and prevalence of obesity in Korean fifth grade children

Hye-Young Kim1, Na-Rae Lee1, Jung-Sug Lee2, Young-Sun Choi3, Tong-Kyung Kwat4, Hae Rang Chung5, Sehyug Kwon6, Youn-Ju Choi7, Soon-Kyu Lee7 and Myung-Hee Kang8

1Department of Food & Nutrition, Yongin University, Yongin 449-714, Korea
2FANSA (Food and Nutrition Statistical Analysis), Seoul 153-764, Korea
3Department of Food & Nutrition, Daegu University, Daegu 712-714, Korea
4Department of Food & Nutrition, Yonsei University, Seoul 120-749, Korea
5Nutrition for the Future Inc., Seoul 151-848, Korea
6Department of Statistics, Hannam University, Daejeon 306-791, Korea
7Dietary Life Safety Division, KFDA, Cheongwon 363-951, Korea
8Department of Food & Nutrition, Daeduk Valley Campus, Hannam University, Daejeon 305-811, Korea

Abstract

This study was performed to investigate the differences in food choice, nutrition labeling perceptions, and prevalence of obesity due to meal skipping in Korean elementary school children. A national survey was performed in 2010 to collect data on food intake frequency, understanding of nutrition labeling, and body mass index from 2,335 fifth grade students in 118 elementary schools selected from 16 metropolitan local governments by stratified cluster sampling. The data were analyzed using the SAS 9.1 and SUDAAN 10.0 packages. Students who consumed three meals for 6-7 days during the past week were classified into the regular meal eating (RM) group (n = 1,476) and those who did not were placed into the meal skipping (MS) group (n = 859). The daily intake frequency of fruits, vegetables, kimchi, and milk was significantly lower in the MS group compared to that in the RM group (P < 0.001), whereas the daily intake frequency of soft drinks and instant noodles (ramyeon) was significantly higher in the MS group than that in the RM group (P < 0.05). The MS group demonstrated a significantly lower degree of understanding with regard to nutrition labeling and high calorie foods containing low nutritional value than that in the RM group. The distribution of obesity based on the percentile criteria using the Korean growth chart was different between the MS and RM groups. The MS group (8.97%) had a higher percentage of obese subjects than that in the RM group (5.38%). In conclusion, meal skipping was related to poor food choice, low perception of nutrition labeling, and a high prevalence of obesity in Korean fifth grade children.

Key Words: Meal skipping, children, food choice, nutrition labeling, obesity

Introduction

Regular meal eating of three meals a day with balanced nutrition is essential for optimal growth and development in children [1]. The family dinner is related to increased intake of healthy foods such as fruits, vegetables, and dairy foods [2]. High-calorie sweet beverages or fast foods are consumed more during meal skipping, because calories that should be ingested in one meal increase [3]. When poor eating behavior continues, excessive energy intake can be accompanied by decreased intake of dietary fiber and micronutrients, resulting in possible threatening of children’s health [4].

Consuming regular meals also has a beneficial influence on study performance and grade of the student [5,6]. In particular, intake of breakfast greatly helps improve memory in children with a risk for nutrient deficiency [7], and the school breakfast program contributes to improve class attendance and academic performance [5,8].

The incidence of obesity in children and adolescents has increased around the world [9]. Obesity in childhood can increase the chance of acquiring metabolic syndrome [10] and the probability of obesity in adulthood [11]. According to the most recent 1998-2007 Korean National Health and Nutrition Examination Survey, the proportion of obese teens doubled from 5.4% to 10.3% [12]. The average incidence of metabolic syndrome in Korean teens is only 4.2%, but that of obese teens
is significantly higher at 31.3% [13].

Meal skipping is related to obesity in many studies conducted abroad [14-16]. The body mass index (BMI) and body weight of children skipping breakfast is higher than in those who eat breakfast [1,17,18]. Additionally, obese children show higher rates of meal skipping compared to non-obese children [19,20]. The reason for obesity due to meal skipping might be related to the observation that children do not select healthy foods or have poor eating habits [3,21].

Nutrition labeling provides proper nutrition information to consumers and helps with reasonable food selection and health management by labeling the type and amount of nutrients in processed foods [22]. “High-calorie low-nutritional value food” is a type of nutrition labeling in Korea that is marked on processed foods due to concerns of developing obesity or nutritional imbalance [23]. A correct understanding of nutrition labeling may help students to prevent obesity through wise selection of healthy foods.

The relationship between meal skipping and risk of obesity has been studied intensively abroad, but that relationship has not been investigated nationwide in Korean children. Therefore, the purpose of this study was to investigate the relationship between meal skipping and prevalence of obesity in Korean children. We hypothesized that meal-skipping students select healthy foods less frequently and have a lower degree of understanding of nutrition labeling compared to those of regular meal eating students. To test this hypothesis, we divided subjects into a meal skipping group (MS) and a regular meal eating group (RM) and investigated the differences in children’s food intake frequency from several food groups, the degree of nutrition labeling understanding, and obesity prevalence.

Subjects and Methods

Subjects and survey methods

This study used data from the 2010 national survey on the “Children's perception and practice level of dietary life” [24]. The survey was conducted in 2,335 (1,141 boys, 48.2% and 1,194 girls, 51.8%) fifth grade students in 118 elementary schools selected from 16 metropolitan local governments by stratified cluster sampling. The survey was conducted between June and July 2010 by personal interview through visits to each school by trained interviewers.

The survey questionnaire included meal intake frequency for breakfast, lunch, and dinner for 1 week and the food intake frequency of fruits, vegetables, kimchi, white milk, flavored milk, pizza, hamburgers, fried chicken, soft drinks, instant noodles, crackers, and chocolate. A visual measure was presented for foods to reduce differences in serving size quantities among individuals [14].

Multiple choice questions on the understanding of nutrition labeling and high calorie foods with low nutritional value were also included in the survey questionnaire. To investigate the degree of understanding of nutrition labeling, the question “What is the nutrient that obese people should carefully check on the nutrition label of a food package?” was included. In addition, to identify the degree of recognition for ‘high calorie foods with low nutritional value’, the question “A high calorie food with low nutritional value is a food that has higher calories and lower nutritional value than general foods and that is related to developing obesity or nutritional imbalance. What is the lowest nutrient in a high calorie food with low nutritional value?” was included.

For meal intake frequency, the frequency of 6-7 times per week was converted to 6.5 times/week, 3-5 times per week was converted to 4 times/week, 1-2 times/week to 1.5 times/week, and no intake to 0 time/week. For the evaluation of food intake frequency for fruits, vegetables, milk, fast-food, and soft drinks during the past week, the frequency of more than twice a day was converted to 2 times/day, once per day to 1 time/day, once every other day to 0.5 times/day, 1-2 times a week to 0.21 times/day, and no intake to 0 times/day.

BMI was calculated from self-reported weight and height obtained from the questionnaires. The percentile for BMI-for-age was calculated. Underweight was defined as a BMI < 15th percentile, normal weight was ≥ 15th percentile and < 85th percentile, overweight was ≥ 85th percentile and < 95th percentile and obesity was ≥ 95th percentile using the age- and sex-specific BMI cutoff points proposed by the Korean Centers for Disease Control and Prevention [25].

The subjects were divided into two groups based on intake of a three regular meal per day pattern. The RM group included those who answered “6-7 times a week” to all three questions that asked how often they ate breakfast, lunch, and dinner. The others were placed into the MS group. The number of subjects in the RM group was 1,476 (64.2%) and that in the MS group was 859 (35.8%).

Statistical analysis

All analyses were conducted using a survey weighting to account for the survey design, which consisted of stratified cluster samples. Probability sampling weights were used in conjunction with strata and primary sampling units to apply weight to the data analysis. The collected data were used to calculate the percentage or mean and standard errors using the SAS 9.12 (SAS Institute, Cary, NC, USA) and SUDDAN 10.0 programs. The difference between groups for food intake frequency was analyzed using Student's t-test, and the frequency difference between the groups for nutrition labeling and high calorie foods with low nutritional value was analyzed using the $\chi^2$-test. Statistical significance was verified at the $\alpha = 0.05$ level.