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Effectiveness of Weight Control Program for Obese Children in Chuncheon*

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ABSTRACT

The effects of a four-week weight control program including nutrition, exercise, behavior modification and meditation were studied in 15 obese children who resided in the Chuncheon area. There were no differences in anthropometric value, health perception, self-esteem and nutrition knowledge before and after the nutrition education program. Food behavior significantly improved after the program, especially in the area of binge eating ($p < 0.05$). Consumption of ramyon and fried chicken significantly decreased ($p < 0.05$). These results showed that short-term nutrition education programs did not do enough to change the anthropometric value of study subjects. These results suggest that it is necessary to include parents in nutrition education programs for greater effectiveness. And there is a need to develop and apply systematic nutrition education programs to reduce the weight of obese children.

KEY WORDS: weight control program, anthropometric values, eating behavior, health perception, nutrition knowledge.

INTRODUCTION

Due to economic growth and westernized eating habits, obesity continues to increase every year in Korea. Especially in the case of children, obesity is on a continuous rise, from 2.0% in 1974[1] to 18.7% in 1993[2] among elementary school students of upper class in Seoul. The figure was 18.7% in 1997 among fifth graders in Inchon.[3] The rate of occurrence of obesity from childhood to adulthood is very high, greatly contributing to the occurrence of diabetes or hyperlipidemia.[4,5]

Obesity not only damages health but can also bring on a so-called inferiority complex in terms of outward appearance, a lack of social skills as well as a loss of self-esteem.[6] Eating tendencies in obese children are reported to include a high rate of skipping meals, over-eating, especially at night, eating too quickly and preferring sweet and greasy foods.[7-10] The aim of treatment of obesity in children from a short-term point of view includes taking steps to bring about weight loss as well as supplying necessary nutrition for growth and development. Long-term aims must include developing correct eating and exercise habits in order to maintain a healthy weight.

Much research has been carried out with regard to the effects of nutrition education on children. It is reported that nutrition education contributes to the acquisition of proper knowledge about nutrition, changes in eating habits, increases in the intake of nutrients as well as weight loss and decreased fat and cholesterol levels in the blood.[11,12] It is also reported that long-term nutrition education involving parents is more effective than short-term, unaccompanied education.[13]

On the other hand, there have been reports that nutrition education has not been effective.[14,15] This is due to a lack of understanding about children's eating habits, unsystematic methods of education and insufficient tools to measure changes in eating behavior.

The purpose of this study was to determine the effects of a four-week weight control program carried out among obese children in Chuncheon. The study focused on the influence upon anthropometric value, eating behavior, perception of health, consumption of instant food and nutrition knowledge, and was intended to serve as a basic information source on nutrition education in treating obesity.

SUBJECTS AND METHODS

1. Subjects

The nurse-teacher in an elementary school in Chuncheon was asked to select obese children for the purpose of conducting research about nutrition education. There were 34 children in the beginning, but at the end of the program, only 15 were left. The children participating in the program were between the ages of 9 and 12, six boys and nine girls. The education program was carried out

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for four weeks, from Sep. 30th to Oct. 21st 2000. Thirty-four children were divided into seven groups of five, and two students in the department of food and nutrition taught each group about nutrition and how to keep dietary records.

2. Anthropometric measurements

Anthropometric measurements included height, weight, hip circumference, waist circumference, and midarm circumference as well as tricep skinfold thickness. Tricep skinfold thickness Measurements were made with a caliper. The measurements were done twice, on the first and last day of the study. Using height and weight, BMI (Body Mass Index) and Röhrer Index were calculated. In order to determine the amount of fat in the abdominal area, the ratio between waist and hip circumference was calculated. In order to determine the amount of body fat, tricep skin fold thickness was measured, and in order to measure the amount of protein in the muscle, upper midarm muscle circumference and midarm fat was calculated from upper midarm circumference and tricep skin fold thickness.

3. Questionnaire

The survey on eating behavior, perception of health, self-esteem, consumption of instant food and knowledge of nutrition was carried out using the same two questionnaires at the beginning and end of the study.

The questionnaire included nineteen questions on eating behavior, seventeen questions on perception of health, eight questions on self-esteem, nine questions on consumption of instant food and twenty five questions on nutrition knowledge. Questions on eating behavior and nutrition knowledge were adapted from research by Moon *et al.*[16] and questions on perception of health and self-esteem were modified from research by *Shon.*[17] and *Lee.*[18]

The answers on the eating behavior and perception of health questions were graded 3 for the affirmative response "yes", 2 for "normal" and 1 for "no". The answers on the self-esteen questions were graded 4 for "very much", 3 for "so-so", 2 for "not likely" and 1 for "almost never". The answers on the consumption of instant food questions were graded 4 for "more than once a week", 3 for "once in 2 weeks", 2 for "once a month" and 1 for "never". The answers on the nutrition kno-wledge questions were graded 1 for correct answers and 0 for incorrect answers.

4. Education program

Education program included nutrition education, behavior modification, exercise and meditation.

1) Nutrition education

On the first day of the classes, a food exhibition was held to motivate and teach the children about food and calories. In the food exhibition, information on calories, calorie requirements, problems with obesity, five basic food groups, low-calorie snacks, exercise and energy expenditure and three meals with 1000, 1200 and 1400 to 1600 kcal were included.

In the first week, videotape was used to introduce to the children to the basic concept of obesity. Children were also informed about the dangers of obesity, the relationship between obesity and diet, and were told about calories, reduced calorie consumption for each individual, as well as ways to fill out dietary records. The class started at 1 : 00 p.m. on Saturday and the students in the department of food and nutrition prepared a lunch that consisted of 1/3 of the 1200 kcal to teach the children about the concept of quality and quantity of food.

Every week the children's dietary records were checked and corrected, and the students were asked to choose the next week's goal. In the second week, the students were taught about a low-calorie diet and re-educated about dietary records. In the third week, information on the calories in snacks, regular food and fast food was given. In the last week, calorie market was held to check upon acquisition of the concept of calorie and how much they can eat. The parents received correspondence about what the students learned each week and were asked to help the students put what they learned into practice at home.

2) Behavior modification

Attention was called to overeating, eating too quickly, eating snacks at night, eating too much greasy food, food temptation and other improper eating behaviors. For reinforcement, children were given school supplies to keep good dietary and exercise records. In the first week of classes, children were motivated by hints that they would receive awards for properly keeping their dietary records, losing weight, modifying their behavior, doing well in group work and participation. To ensure their parents' participation, the students were asked to complete quizzes with their parents' help. Parents received letters about each week's progress, which allowed for indirect education of parents as well.

3) Exercise

The students in the department of leisure led the exercise therapy. It lasted one hour each time, and consisted of using hula-hoops, vigorous dancing and stretching, as it was reported that these exercises were effective in promoting weight control.[19,20] The students were advised to keep exercise records to ensure they did it every day.

4) Meditation

As meditative therapy, the students were advised to spend 10 minutes before exercising imagining themselves after losing weight. This was done to affirm their decision to lose weight. Meditation was added to the program based on a report[21] that in cases where nutrition education was carried out with meditation, students lost weight faster and the chances of students regaining the weight was much lower than when nutrition education alone was offered.

5. Statistical analysis

The statistical analysis was conducted using SPSS package. Mean and standard deviation were calculated for all variables. Statistical significance before and after the classes was determined by paired t-test, and the variables in rank (eating behavior, perception of health, self-esteem, consumption of instant food) were determined by the nonparametic wilcoxon test.

RESULTS AND DISCUSSION

1. Changes in anthropometric value

The average weight and height of the boys and girls, as well as all the variables concerning obesity that were measured before the program are shown in Table 1. The mean height and weight of the boys was 142.33 cm and 49.33 kg, respectively, and the height and weight of the girls was 141.56 cm and 46.78 kg. According to The Growth Chart for Korean Children, produced by the Korean Pediatric Society in 1998,[22] the average height and weight for boys was 137.8 cm and 34.47 kg, respectively, and the average height and weight for girls was 137.7 cm and 33.59 kg. When judged by these standards, the children participating in the research were taller and heavier than average. Also, the boys' height and weight was in the 97th percentile (49.33 kg) based on the Height/Weight percentile for Korean Children. In the case of the girls, the Height and Weight percentile was also at about the 97th percentile level, which is 46.78 kg.

The obesity of the children in this program was 128.83 for the boys and 125.33 for the girls according to the Broca Index. This means they were at more than 120% of the normal. Röhler Index (RI) is an index used to measure obesity in children before adolescence. According to RI, of those in the height range of 130–149 cm, 170 is considered obese. In this research, the boys' average was 169.71 and the girls' average was 162.41. Therefore the results proved to be very close to 170.

On the other hand, BMI is the most commonly used measurement index for people 18 years and over, and is a very useful index for measuring body fat. However, KaHee and AmMee of Japan[23] consider BMI level 20 and over to be obese in the case of children aged 10–12. In this study, the average BMI was 24.15 for the boys and 23.02

Table 1. Anthropometric value on before and after nutrition education by sex

	Before			After		
	Male	Female	T-value	Male	Female	T-value
Height (cm)	142.33 ± 9.31[1]	141.56 ± 9.04	0.026	142.81 ± 9.54	141.42 ± 9.21	0.080
Weight(kg)	49.33 ± 8.78	46.78 ± 10.43	0.244	49.33 ± 8.78	46.44 ± 10.35	0.315
MAC (cm)[2]	25.00 ± 1.67	23.56 ± 2.07	2.025	25.67 ± 1.75	23.67 ± 1.94	4.129
Tricep skin fold thickness (mm)	31.00 ± 6.07	26.00 ± 2.96	4.606	31.80 ± 5.88	26.25 ± 5.15	2.457
Waist (cm)	79.17 ± 5.88	75.67 ± 6.93	1.030	79.20 ± 5.36	73.44 ± 6.56	2.784
Hip (cm)	86.33 ± 7.76	86.00 ± 7.79	0.007	89.00 ± 7.52	86.22 ± 7.84	0.415
Broca index	128.83 ± 5.98	125.33 ± 9.11	0.680	129.00 ± 6.03	124.56 ± 8.68	1.179
BMI[3]	24.15 ± 1.67	23.02 ± 2.59	0.877	24.15 ± 1.67	22.86 ± 2.56	1.182
Röhrer index[4]	169.71 ± 8.42	162.41 ± 11.83	1.671	169.71 ± 8.42	161.32 ± 11.37	2.398
WHR[5]	0.92 ± 0.04	0.88 ± 0.05	2.145	0.89 ± 0.03	0.85 ± 0.06	1.944
MAMC[6] (cm)	15.27 ± 1.19	15.39 ± 2.03	0.018	16.01 ± 2.00	15.13 ± 1.37	0.902
Arm fat area(cm^2)[7]	3.17 ± 2.65	5.11 ± 1.48	3.354	3.09 ± 4.35	4.78 ± 1.82	0.974

1) Mean ± SD

2) MAC: Mid Arm Circumference

3) BMI: Body Mass Index: $\frac{Weight\ (kg)}{Height\ (m)^2}$

4) Röhrer index: $\frac{Weight\ (kg)}{Height\ (cm)^3 \times 10^7}$

5) WHR: Waist-Hip Ratio: $\frac{Waist\ circumference\ (cm)}{Hip\ circumference\ (cm)}$

6) MAMC: Mid Arm Muscle Circumference: MAC-π · TSF

7) Arm fat area (cm^2): $\frac{MAC \cdot TSF}{2} - \frac{\pi \cdot (TSF)^2}{4}$

for the girls, so the research subjects could be construed as obese in the view of the Japanese. Lim *et al.*[24] consider children with a BMI of 20.1 - 25.0 to be obese and Kim *et al.*[25] consider the average BMI for obesity to be 21.0 ± 1.85. The waist and hip ratio provided an index of regional body fat distribution and in this study, the boys were 0.92 and the girls 0.88. Setting adults as the standard, 0.95 and over for men and 0.85 and over for women are levels that put them in danger of heart-related disease and related death rate increases. As the standard for children has yet to be decided, it is hard to exactly determine the obesity level, although it is probably high. Therefore it is imminent that proper standard is set in the near future.

Table 2 is an index representing weight and obesity after the classes. In Table 2, boys and girls were not separated because there were no significant differences in indices representing weight and obesity before and after the classes. The children as a group did not show any changes in weight, physical index or obesity index before and after the classes, but waist and hip ratio fell significantly ($p<0.05$).

In research by Kim *et al.*,[11] when fourth and fifth grade obese children and their parents were educated for 20 weeks, the children's weight showed significant decreases compared to the others. Park *et al.*[12] reported that when preschool and elementary school students and their parents were educated for six months, the children's weight decreased significantly. The education period of these two studies were long-term and the reason for the absence of change in weight in this study can be viewed as a result of the short-term nature of the education program and a lack of support from parents.

2. Changes in eating behaviors, perception of health, self-esteem, consumption of instant food and nutrition knowledge

The scores in each of the variables: eating behavior, perception of health, self-esteem, consumption of instant food and nutrition knowledge before and after the classes were added up and the results are shown in Table 3. Eating behavior and consumption of instant food changed significantly after the education program ($p < 0.05$). However, the others did not change.

1) Changes in eating behaviors

Table 4 shows the changes in eating behavior. Characteristics of obese people include irregular meal-taking, over-eating, eating too quickly, eating too many snacks and eating while watching TV7.[26,29] Positive eating behavior "yes" was scored 3, "normal" was scored 2, and "no" was scored 1. When they were added together, all the variables were above average. The highest score in the eating behavior section was "always have lots of food around" 2.87, "eat snacks at night" 2.73, "family likes

Table 2. Changes in anthropometric value after nutrition education

Variables	Before	After	T-value
Height (cm)	141.87 ± 8.82[1]	142.33 ± 9.31	0.695
Weight (kg)	47.80 ± 9.56	47.60 ± 9.53	1.871
MAC (cm)[2]	24.13 ± 2.00	24.47 ± 2.07	-1.581
Triceps skin fold thickness (mm)	27.85 ± 5.27	28.38 ± 6.58	-0.305
Waist (cm)	76.86 ± 6.75	75.50 ± 6.60	2.007
Hip (cm)	86.50 ± 7.64	87.21 ± 7.56	-1.681
Broca index	126.73 ± 7.96	126.33 ± 7.82	1.146
BMI[3]	23.47 ± 2.27	23.37 ± 2.27	1.840
Röhrer index	165.31 ± 10.92	164.61 ± 10.82	1.827
WHR[4]	0.89 ± 0.05	0.87 ± 0.05	3.004*
MAMC (cm)[5]	15.21 ± 1.54	15.52 ± 1.63	-0.511
Arm fat area (cm^2)	4.28 ± 2.23	4.14 ± 3.00	0.148

1) Mean ± SD
2) Mid Arm Circumference
3) Body Mass Index
4) Waist-Hip Ratio
5) Mid Arm Muscle Circumference
*: $p < 0.05$

Table 3. Changes in food behaviors, perception of health, self esteem, intake of instant foods and nutrition knowledge score after nutrition education

Variables	Before	After	T-value
Food behaviors	44.67 ± 5.05[1]	47.07 ± 5.51	-3.180*
Perception of health	38.07 ± 5.31	40.20 ± 6.30	-1.804
Self esteem	19.73 ± 4.35	21.27 ± 4.17	-1.951
Intakes of instant foods	19.60 ± 5.28	16.73 ± 4.50	2.475*
Nutrition knowledge score	16.00 ± 2.24	16.67 ± 2.99	-1.276

1) Mean ± SD, *: $p < 0.05$

sweet food" 2.60, and "unbalanced meals/ binge eating" 2.53. After the nutrition education program, binge-eating habits saw a significant decrease ($p < 0.05$).

In the nine-week education program conducted by Shannon *et al*,[30] the only change in eating behavior occurred in the area of snack choices. Changes in eating behavior relate directly to behavior, so in order to assimilate lessons into one's everyday lifestyle, continued education is necessary.

2) Changes in perception of health

Table 5 shows results in the perception of health. The scores were "short of breath while walking" 2.67, "don't get along with others" 2.60, "often have upset stomach" 2.53, "often get depressed" 2.47, and "unhealthy" 2.33. Perception of health after the classes did not change much, but after the education program, the number of responses of "unhealthy" was significantly lower than before the classes ($p < 0.05$). This can be interpreted as a sign that children thought they became healthier after learning about eating, exercising and meditating and that they were controlling their own weight.

3) Changes in self-esteem

The results with respect to changes in self-esteem are shown in Table 6. Each variable was scored 4 for "very

Table 4. Changes in food behavior after nutrition education

Variables	Before	After	T-value
Regularity of meals	2.13 ± 0.83	2.27 ± 0.70	-0.535
Skipped breakfast	2.13 ± 0.83	2.40 ± 0.74	-1.414
Overeating	2.27 ± 0.70	2.47 ± 0.74	-1.342
Heavy dinner	2.00 ± 0.65	2.20 ± 0.68	-0.905
Fast eating	2.07 ± 0.88	2.27 ± 0.88	-1.342
Unbalanced meals	2.53 ± 0.74	2.53 ± 0.64	0.000
Eat a lot of snack	2.47 ± 0.52	2.60 ± 0.63	-0.816
Likes fatty foods	1.73 ± 0.59	1.87 ± 0.52	-1.414
Family likes sweet foods	2.60 ± 0.63	2.40 ± 0.83	-0.966
Release stress by eating	2.53 ± 0.64	2.60 ± 0.51	-0.378
First priority is buying food	2.60 ± 0.74	2.80 ± 0.41	-1.134
Uncontrolled appetite	2.20 ± 0.68	2.33 ± 0.72	-0.816
Can't stand hungry	2.07 ± 0.70	2.07 ± 0.70	0.000
Always have lots of food around	2.87 ± 0.35	2.93 ± 0.26	-1.000
Binge eating	2.53 ± 0.64	2.87 ± 0.35	-2.236*
Eat night snacks	2.73 ± 0.46	2.67 ± 0.49	-0.577
When I watch or read, I eat	2.33 ± 0.72	2.47 ± 0.64	-0.632
Eat at dinning table	2.60 ± 0.74	2.67 ± 0.72	-0.272
Eating out frequently	2.27 ± 0.80	2.67 ± 0.72	-1.730

1) Mean ± SD, * : $p < 0.05$

Table 5. Changes in perception of health after nutrition education

Variables	Before	After	T-value
Always tired	2.07 ± 0.70[1)]	2.07 ± 0.80	0.000
Get angry easily	2.13 ± 0.83	2.20 ± 0.77	-0.378
Don't get along with others	2.60 ± 0.51	2.73 ± 0.70	-0.816
Often upset stomach	2.53 ± 0.74	2.80 ± 0.56	-1.414
Often indigestion	2.13 ± 0.74	2.47 ± 0.74	-1.890
Often have muscle stiffness	2.20 ± 0.94	2.67 ± 0.72	-1.444
Often hard to walk	2.33 ± 0.82	2.67 ± 0.72	-1.508
Have out of breath while walking	2.67 ± 0.49	2.40 ± 0.83	-1.633
Sweat even if it's hot	2.33 ± 0.72	2.40 ± 0.74	-0.276
Often feel insecure	2.20 ± 0.86	2.13 ± 0.83	-0.378
Often have catch cold	2.13 ± 0.83	2.27 ± 0.88	-0.632
Unhealthy	2.33 ± 0.72	2.67 ± 0.62	-2.236*
Can't concentrate when study	2.20 ± 0.56	2.40 ± 0.63	-1.342
Don't have active life style	1.87 ± 0.52	1.73 ± 0.59	-0.513
Uncomfortable having a obesity	1.73 ± 0.80	1.87 ± 0.74	-0.632
Often get depressed	2.47 ± 0.74	2.53 ± 0.74	-0.264
Constipation	2.13 ± 0.92	2.20 ± 0.86	-1.000

1) Mean ± SD, * : $p < 0.05$

much", 3 for "so-so", 2 for "not likely" and 1 for "almost never". The results were 3.0 for "I can perform as well as others", 2.80 for "I am as valuable as others", 2.67 for "I am satisfied with my physical appearance" and 2.53 for "I am satisfied with myself". Study subjects were dissatisfied with their appearance or had damaged pride as a result of their obesity. The increase in the response "I am satisfied with myself" after the nutrition education program was a sign of increased self-esteem ($p < 0.05$).

4) Changes in consumption of instant food

Table 7 shows changes in the consumption of instant food. According to Lee's research,[31] favored snacks among boys are ddukbokgi, ice cream, kimbap, chicken, pork cutlet, hamburgers, ramyon, hot dogs and boiled fish, in that order. Girls prefer kimbap, ddukbokgi, pizza, hamburgers, pork cutlet, fried chicken, ramyon, and hot dogs. In this study, consumption of ramyon, kimbap, boiled fish, pork cutlet, and ddukbokgi was high. However, after the education program, consumption of ramyon and hamburgers decreased significantly ($p < 0.05$). Children were taught that ramyon and hamburgers were especially greasy and fattening, and it appears to have been effective because children decreased their consumption of these foods.

5) Changes in nutrition knowledge

Table 8 shows changes in nutrition knowledge before and after the education program.

A total of twenty five questions were divided into four categories. There were Thirteen questions on the basic function of nutrients, six questions on sources of nutrients, three questions related to obesity and three questions on selecting foods related to obesity. There were no changes in nutrition knowledge before and after the classes.

According to number of similar research studies,[8,11,12] although there were no changes in eating behaviors among study participants, there were considerable changes in nutrition knowledge after they took related classes. After a three-day education program by Lee,[8] scores increased significantly. This can be attributed to the fact that eating behaviors or eating habits are established over a long period, but the knowledge was acquired in a short time. The reason for a lack of change in this research may be

Table 6. Changes in self esteem after nutrition education

Variables	Before	After	T-value
I am valuable as others	2.80 ± 0.86[1)]	2.80 ± 0.94	-0.175
I believe I have many good qualities	2.40 ± 0.83	2.73 ± 0.80	-1.508
I can perform well as others	3.00 ± 0.85	2.87 ± 0.99	-0.491
I am happy with myself	2.80 ± 1.08	3.07 ± 1.03	-1.633
I am satisfied with myself	2.53 ± 0.99	3.07 ± 0.88	-2.828*
I am confidence in my physical appearance	1.87 ± 0.74	2.07 ± 0.80	-1.134
I am not embarrassed tell others about my weight	1.67 ± 0.72	1.80 ± 0.86	-0.632
I am satisfied in my physical appearance	2.67 ± 1.05	2.87 ± 0.99	-1.000

1) Mean ± SD, *: $p < 0.05$

Table 7. Changes in consumption of instant foods after nutrition education

Variables	Before	After	T-value
Hamburger	1.80 ± 1.01[1)]	1.73 ± 0.70	-0.264
Ramyon	3.33 ± 0.90	2.20 ± 0.86	-2.859*
Hot dog	1.40 ± 0.63	1.53 ± 0.64	-0.816
Pork cutlet	2.07 ± 1.03	1.80 ± 0.77	-1.414
Ddukbokgi	2.07 ± 1.03	2.00 ± 0.93	0.000
Dumbling	2.00 ± 0.93	1.73 ± 0.70	-1.190
Kimbap	2.60 ± 0.83	2.27 ± 1.03	-0.914
Boiled fish paste	2.27 ± 1.03	1.87 ± 0.99	-1.613
Fried chicken	2.07 ± 0.88	1.53 ± 0.83	-2.333*

1) Mean ± SD, *: $p < 0.05$

Table 8. Changes in nutrition knowledge after nutrition education

Content	Maximum score	Before	After	T-value
General function of nutrients	13	7.64 ± 1.86[1)]	7.85 ± 1.83	-0.508
Food source of nutrients	6	4.78 ± 1.37	4.85 ± 1.03	-0.268
General knowledge related to obesity	3	2.21 ± 0.80	2.21 ± 0.70	0.000
Food selection related to obesity	3	2.50 ± 0.65	2.43 ± 0.76	0.366

1) Mean ± SD

the unrelated nature of the questions on the questionnaires to the education program. Also, on the first visit, parents told children the answers to the questions, which negated the questionnaire's effectiveness.

The questions on the elementary school students' questionnaire are various and the results are hard to directly compare. Therefore, different situations must be considered. In order to generalize the research content, it is necessary to develop standardized evaluation sheets on the children's nutrition knowledge in order to analyze the effectiveness of the nutrition education program.

SUMMARY AND CONCLUSION

This study focused on the effects of a four-week weight control program on weight, eating behavior, perception of health, self-esteem, consumption of instant foods and nutrition knowledge. It was carried out on 15 obese elementary school students in Chuncheon.

Eating behavior before and after the education program showed significant decreases in over-eating ($p < 0.05$). In terms of perception of health before and after the classes, the results showed a significant decrease among students in thoughts that they were unhealthy. As to the matter of self-esteem ($p < 0.05$), there was a significant increase in the number of participants that were satisfied with themselves ($p < 0.05$) after participating in the education program. In terms of instant food consumption, consumption of ramyon and fried chicken decreased significantly ($p < 0.05$). Nutrition knowledge showed no change.

In conclusion, a short-term weight control program with parents' inactive support proved to be ineffective. Nutrition education for obese children must include information on correct eating habits as well as on exercise and healthy lifestyles. In the course of developing a nutrition education program, it is necessary to understand children's eating habits and form a systematic and varied education program. It is also important to generalize indices of measurement. Last of all, it is important that nutrition education programs be promoted in schools so that students, friends, as well as parents can take an active part.

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