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A Study on Dietary Behaviors and Food Preference of Elementary School Children in Gyeonggi Area

Mi-Sung Nam and Kyung-Hee Song[§]

Department of Food and Nutrition, Myongji University, Yongin, Gyeonggido 449-728, Korea

To investigate the dietary behavior and food preference by the obesity index, 524 children (male 265, female 259) from 4 elementary schools in Gyeonggi area participated in this study. The overweight group included more boys (52.5%) than girls (47.5%). The overweight group had significantly higher values in height, weight, Obesity index (OI), Body mass index (BMI), and Rohrer index (RI) than the underweight or normal weight groups. The majority (43.4%) of children showed 11~20 minutes of eating time, and boys ate significantly rapidly than girls ($p<0.001$). Snack was consumed 2~3 times a day, with the preference principally for ice-cream and cookies. The frequency of eating out was 1~2 times a month, representing 71.4% of subjects, and 73.3% of children preferred Korean style meals, followed by Western, Chinese and Japanese foods. Twigim (frying) was the preferred cooking method for vegetables, fish and meat. The food preference study showed that Ssalbap, Hyunmibap and Boribap were preferred in the rice group. For one-dish foods in the rice group, Jjajangbap, Kimchibokeumbap, Bokeumbap were preferred, with the tendency that boys preferred significantly more Curry rice ($p<0.05$) and Chickenbap ($p<0.01$) than girls. The preference for guk, jjigae, and tang group showed that Soegogimiyeokguk, Chamchikimchijjigae were preferred. Boys preferred significantly more Samgyetang ($p<0.05$), Haemultang ($p<0.05$) and Yukgaejang ($p<0.01$) than girls, and girls preferred significantly more Kongbijjijigae ($p<0.05$) than boys.

It is considered that organized and continuous nutritional education beginning in childhood, is necessary to for the development and formation of desirable dietary behaviors.

Key Words: Dietary behavior, Food preference, Obesity index, Elementary school children

INTRODUCTION

Rapid economic development has brought many changes in our society since the 1970s. many changes in our society since the 1970s. Economic improvements, the extension of nuclear family and the increase of dual income family with increased numbers of working women changed dietary habits and food preferences into westernized patterns, which in turn decreased the preference for traditional foods.

Also, instant foods and the development of restaurant industry have caused child obesity and chronic diseases. Food experience in childhood is important in the formation of food preference and dietary behavior in relation to food consumption.[1,2]

Particularly the childhood during the higher grades in the elementary school is an important period for physical growth, along with the maturation of perception ability and the development of self-concept, which is leading into puberty. Thus health and nutritional management in this period is very important because poor or excessive consumption of nutrients may cause health problems that affect physical and emotional development of children.[3]

Dietary behavior is not developed in a short period of time but in a long period of time that begins in the weaning period through the education in the family, school and society. Also, it is influenced by various factors such as culture, religion, age, education levels, family members, and socioeconomic levels. Food preference, which directly affects the food consumption, is changed depending on dietary environment, family, environment, personality, age, gender, desire, physical composition, and health status.[4,5]

Also, dietary behaviors determine the quality and quantity of food consumption in addition to individual dietary patterns, and finally influence not only an individuals health and physical constitution but also changes in behaviors, disease aspects, and intelligence.[6,7]

When considering the point that dietary behaviors and food preferences are not easily changed after once developed, the establishment of good dietary behavior during the childhood particularly during the elementary school period is very important.[8]

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§ To whom correspondence should be addressed.

Therefore, consistent and continuous concerns and guidance from family, school and society are required to develop good and proper dietary habits from the elementary ages, and the management of pleasant dietary habits should be maintained at school and at home by developing menus that sufficiently reflect appropriate quantity of nutrients and food preferences. Therefore, the purpose of this study was to investigate dietary behaviors and food preferences of children in Gyeonggi area and to provide basic data for the guidance of desirable dietary behaviors for the improvement of health and physical constitution.

SUBJECTS AND METHODS

1. Subjects

Subjects in this study were 524 children of 4th to 6th grades from 4 elementary schools located in Anseong, Gyeonggi-do. The survey was performed in July and August of 2004.

2. Methods

General Characteristics and Anthropometric Measurements

General information including gender, grade, mother's work status, residence condition, number of family members, attendance in extracurricular activities, and monthly average food expenses were investigated to understand general characteristics and socioeconomic status of subjects. The obesity index (OI) was calculated from values of weight and height measured by an automatic height/weight scale (GM-1000, Neogmtec) and the percent standard weight by height of Korean children as ideal body weighft (IBW), which was published by the Korean Pediatric Society. OI less then 90 was considered as underweight, 90~110 as normal, and over 110 as overweight. Also, the Rohrer Index (RI), which has higher correlation with body fat, was calculated.

$$OI\ (\%) = \{\text{Body weight (kg)}/\text{IBW (kg)}\} \times 100$$

$$RI = \{\text{Body weight (g)}/(\text{height (cm)})^3\} \times 10^4$$

Dietary Behaviors

The regularity of breakfast, type of breakfast, duration of meal time, amount of a meal, other activities during the meal time, daily frequency of snack consumption, type of snacks, frequency of monthly eating out, type of eating out, cooking preference, and favorite foods were assessed to investigate the dietary behavior of subjects.

Food Preference

To observe the preference of the subjects for some food, series of food list were made considering the menu of the four schools in Anseong, Gyeonggi do and relevant research results. To measure the preference for foods by gender, 85 questions of 10 types such as main meal, one-dish foods, side dishes, or dessert were selected and scored using a 5-point scale (very disliked: 1 point, disliked: 2 points, normal: 3 points, liked: 4 points, very liked: 5 points). Food preference was studied by dividing questions into groups according to cooking methods such as 10 questions for rice group, 9 questions for one-dish foods, 21 questions for guk·tang·jjigae, 7 questions for jjim·jorim, 8 questions for bokeum, 7 questions for twigim, 5 questions for jeon, 9 questions for muchim, 4 questions for dessert, and 5 questions for Kimchi group.

3. Statistical Analysis

Collected data were coded and analyzed using SPSS (Statistical Package for the Social Science) program. The general information of subjects was expressed as frequency and percentage, and the physical measurement as mean and standard deviation. The significance was verified using x^2-test and ANOVA, and the correlation of variables was obtained using Pearson's Correlation coefficient. Dietary behavior and food preference were compared by using x^2-test and t-test.

RESULTS AND DISCUSSION

1. General Characteristics and Anthropometric Measurements

General characteristics of subjects are shown in Table 1. Among a total of 524 subjects, 265 subjects (50.6%) were boys and 259 subjects (49.4%) were girls. For grades, 176 subjects (33.6%) were at 4th grade, 175 subjects (33.4%) at 5th grade and 173 subjects (33.0%) at 6th grade, showing almost even distribution among grades. Mother's employment status showed that 70.4% was employed and 29.6% was unemployed. Housing type showed that private house was the highest with 46.2% and followed by 30.2% in apartment, 20.0% in tenement house, and 3.6% in other types.

The presence of extracurricular activities showed that 68.3% of children attended and 31.7% that did not attend this type of activities. For monthly food expenses, 54.6% spent 310,000~500,000 won, 33.6% spent 110,000~300,000 won, 7.6% spent less than 100,000 won, and 4.2% spent over 510,000 won.

General information according to the Obesity Index is presented in Table 2. On the basis of the Obesity Index, boys represented 52.5% of the overweight group

Table 1. General characteristics of subjects

Variables	Male(%)	Female(%)	Total(%)
Grade			
4	84(16.0)	92(17.6)	176(33.6)
5	88(16.8)	87(16.6)	175(33.4)
6	93(17.8)	80(15.2)	173(33.0)
Mother's employment status			
Yes	190(36.3)	179(34.1)	369(70.4)
No	75(14.3)	80(15.3)	155(29.6)
Style of house			
Private house	120(22.9)	122(23.3)	242(46.2)
Apartment	78(14.9)	80(15.3)	158(30.2)
Tenement house	60(11.5)	45(8.5)	105(20.0)
Other	7(1.3)	12(2.3)	19(3.6)
Number of family			
≤2	2(0.4)	0(0.0)	2(0.4)
3	20(3.8)	15(2.9)	35(6.7)
4	132(25.2)	140(26.7)	272(51.9)
≥5	111(21.2)	104(19.8)	215(41.0)
Extracurricular activities			
Yes	180(34.3)	178(34.0)	358(68.3)
No	85(16.3)	81(15.4)	166(31.7)
Food expenses per month (in thousands of won)			
≤ 100	19(3.6)	21(4.0)	40(7.6)
110-300	80(15.3)	96(18.3)	176(33.6)
310-500	156(29.8)	130(24.8)	286(54.6)
≥510	10(1.9)	12(2.3)	22(4.2)
	265(50.6)	259(49.4)	524(100)

Table 2. General characteristics by obesity index

N(%)

Variables	Items	Obesity index: Underweight (N=172)	Normal (N=192)	Overweight (N=160)	Total (N=524)	x^2
Gender	Male	84(48.8)	97(50.0)	84(52.5)	265(50.6)	0.445
	Female	88(51.2)	95(49.5)	76(47.5)	259(49.4)	ns[1)]
Grade	4	59(34.3)	68(35.4)	49(30.6)	176(33.6)	1.091
	5	56(32.6)	64(33.3)	55(34.4)	175(33.4)	ns
	6	57(33.1)	60(31.3)	56(35.0)	173(33.0)	

1) NS: no significant

which was higher than 47.5% in girls. The overweight group by grades showed that 34.4% was in the 5th grade and 35.0% in the 6th grade, which were higher than 30.6% in the 4th grade, and on the contrary, the normal group showed that 35.4% was in the 4th grade, 33.3% in the 5th grade, and 31.3% in the 6th grade, representing more 4th graders in the normal weight group.

The analysis of height, weight, BMI, OI, and RI of subjects according to the Obesity Index is shown in Table 3. The height of the overweight group was significantly higher than other two groups ($p<0.001$). Also, BMI ($p<0.001$), OI ($p<0.001$) and RI ($p<0.001$) of the overweight group were significantly higher than those of other two groups.

The correlations among anthropometric measurements are shown in Table 4. There were positive correlations between weight and height ($p<0.001$) and between RW and height and weight ($p<0.001$). Also, there were positive correlations ($p<0.001$) between BMI and height, weight and RW, between OI and height, weight, RW, and BMI, and between RI and weight, RW, BMI and OI, which were all statistically significant. There was no statistically significant correlation between RI and height. Therefore, it was considered that RI and OI were affected by weight.

Table 4. Correlation coeffcients among anthropometric values

N(%)

	Height (cm)	Weight (kg)	RW	BMI	Obesity index
Weight(kg)	0.701***[1)]				
RW[2)]	0.536***	0.946***			
BMI	0.272***	0.871***	0.957***		
Obesity index	0.499***	0.908***	0.929***	0.888***	
Rohrer index	-0.067	0.654***	0.801***	0.941***	0.743***

1) Pearson's correlation coefficient(r)
2) Relative Weight=(Weight/height)×100
***p<.001

Table 3. Anthropometric characteristics by obesity index

Variables	Obesity index: Underweight (N=172)	Normal (N=192)	Overweight (N=160)	Total (N=524)	F-value
Height(cm)	138.04±6.19[a,1)]	141.77± 6.73[b]	147.51± 8.14[c]	142.30± 7.97	76.074***
Weight(kg)	31.03±3.49[a,2)]	37.73± 4.28[b]	49.31± 7.06[c]	39.07± 8.94	543.579***
BMI[3)]	16.26±1.28[a]	18.77± 1.69[b]	22.66± 2.68[c]	19.13± 3.21	453.835***
Rohrer index[4)]	118.08±11.11[a]	132.87±14.89[b]	154.27±21.93[c]	134.55±21.84	203.694***
Obesity index[5)]	81.11±6.27[a]	98.69± 5.87[b]	127.71±14.52[c]	101.78±20.96	1017.638***

1) Mean±SD
2) Mean with different letters are significantly different at $\alpha=0.05$ by Duncan's multiple range test.
3) Body mass index={Body weight(kg)/height(m)^2}
4) Rohrer index={Body weight(g)/(height(cm))^3}×10^4
5) Obesity index={Body weight(kg)/IBW(kg)}×100
***p<.001

2. Dietary Behaviors

Breakfast

The regularity of breakfast is presented in Table 5, in which 55.9% of children ate breakfast everyday. For gender differences, 6.8% of male students and 3.9% of female students did not eat breakfast at all and 57.1% of female students and 54.7% of male students ate breakfast everyday. these findings were similar with other studies.[9-13)]

For the type of breakfast, rice was the highest which was consumed by 88.9% of subjects, and then followed by bread or cereal (7.5%), others (2.4%), and Seonsik (1.2%). The majority of boys and girls ate rice as a breakfast food with the ratio of 88.3% and 89.6%, respectively, without showing any difference. This result was consistent with the study conducted by Kim,[14)] Choe *et al.*.[15)]

Table 5. Regularity and type of breakfast in subjects

Variables	Male	Female	Total	x^2(df)
Regularity of breakfast				
Everyday	145(54.7)	148(57.1)	293(55.9)	
Frequently	61(23.0)	51(19.7)	112(21.4)	4.03(3)
Sometimes	41(15.5)	50(19.3)	91(17.4)	ns[2)]
Not eat	18(6.8)	10(3.9)	28(5.3)	
Total	265(50.6)	259(49.4)	524(100.0)	
Type of breakfast				
Rices	218(88.3)	223(89.6)	441(88.9)	
Bread or Cereal	20(8.1)	17(6.8)	37(7.5)	0.29(3)
Seonsik[1)]	3(1.2)	3(1.2)	6(1.2)	ns
Other	6(2.4)	6(2.4)	12(2.4)	
Total	247(49.8)	249(50.2)	496(100)	

1) Mixed powder made with various grains and vegetables
2) NS: no significant

Eating speed, Amount of meal, Other behaviors during the meal time

As shown in Table 6, the eating speed was 11~20 minutes in 43.3% of subjects, followed by 10 minutes (26.7%), 21~30 minutes (18.9%) and over 30 minutes (11.1%). For gender differences, 34.0% of male students and 19.3% of female students spent 10 minutes, and 23.9% of female students and 14.0% of male students spent 21~30 minutes, which were significantly different from the majority of students with 11~20 minutes of eating speed. It showed that male students ate faster than female students.

The result for the quantity of a meal showed that 71.6% of subjects ate properly, followed by light (16.8%) and over (11.6%), which were consistent with results in studies by Lee[16)] and Kim.[17)]

The percentage of students who ate meal while watching television or reading books sometimes was 57.4%, more than half of the total subjects, followed by generally (17.0%) and always (7.3%), and 18.3% of children responded none. It showed that most children ate meals while watching television or reading books, without any gender difference.

Lee *et al.*[9)] reported in the study of dietary behaviors in middle and high school students that 50.3% of students ate meals while watching television or reading books or newspapers and 28.3% ate meals while talking or listening music, and 18.7% just ate their meals.

Table 6. Eating speed, quantity of a meal and other behaviors during the meal time in subjects

Variables	Male	Female	Total	x^2 (df)
Eating speed (min)				
10	90(34.0)	50(19.3)	140(26.7)	
11-20	109(41.1)	118(45.6)	227(43.3)	18.03***
21-30	37(14.0)	62(23.9)	99(18.9)	(3)
≥30	29(10.9)	29(11.2)	58(11.1)	
Total	265(50.6)	259(49.4)	524(100.0)	
Quantity of a meal				
Over	35(13.2)	26(10.0)	61(11.6)	1.57(2)
Properly	184(69.4)	191(73.7)	375(71.6)	ns[1)]
Light	46(17.4)	42(16.2)	88(16.8)	
Total	265(50.6)	259(49.4)	524(100.0)	
Other behaviors during the meal time				
Always	24(9.1)	14(5.4)	38(7.3)	
Generally	44(16.6)	45(17.4)	89(17.0)	5.58(3)
Sometimes	142(53.6)	159(61.4)	301(57.4)	ns
None	55(20.8)	41(15.8)	96(18.3)	
Total	265(50.6)	259(49.4)	524(100.0)	

***p<.001
1) NS: no significant

Snacks and Eating Out

The frequency of snack consumption is presented in Table 7, in which 32.3% consumed 2~3 times everyday, followed by 30.9% has once and 7.8% had more than 4 times, but 29.0% rarely consumed snacks. This result was consistent with the study conducted by Sung *et al.*.[19)] For the type of snacks, ice cream (43.7%) was the most consumed type of snack, followed by cookies with 32.1%, Tteokboki with 13.9%, and breads with 10.3%. For gender differences, 12.8% of male students and 7.7% of female students ate breads as a snack, showing more boys ate breads than girls, while more female students ate cookies and ice cream with 34.0% and 45.2%, respectively, than male students but with no statistically significant differences.

Kim[20)] reported that 30.2% of college students consumed cookies most often, showing that cookies were consumed as the most favorite snack.

These findings were similar with other studeis.[21-23)]

For the frequency of family eating out, 71.4% showed 1~2 times a month, followed by 17.2% with 3~4 times,

Table 7. Frequency and kind of snack and eating out in subjects

Variables	Male	Female	Total	x^2 (df)
Frequency of snacks (day)				
None	87(32.8)	65(25.1)	152(29.0)	
1 times	78(29.4)	84(32.4)	162(30.9)	7.45(3)
2-3 times	75(28.3)	94(36.3)	169(32.3)	ns[2]
≥4 times	25(9.4)	16(6.2)	41(7.8)	
Total	265(50.6)	259(49.4)	524(100.0)	
Kind of snack				
Cookies	80(30.2)	88(34.0)	168(32.1)	
Ice cream	112(42.3)	117(45.2)	229(43.7)	4.39(3)
Breads	34(12.8)	20(7.7)	54(10.3)	ns
Tteokboki[1]	54(10.3)	34(13.1)	73(13.9)	
Total	265(50.6)	259(49.4)	524(100.0)	
Frequency of eating out (month)				
None	19.2(7.2)	25(9.7)	44(8.4)	
1-2 times	191(72.1)	183(70.7)	374(71.4)	1.22(3)
3-4 times	46(17.4)	44(17.0)	90(17.2)	ns
≥5 times	9(3.4)	7(2.7)	16(3.1)	
Total	265(50.6)	259(49.4)	524(100.0)	
Kind of eating out				
Korean Food	181(73.6)	171(73.1)	352(73.3)	
Japanese Food	10(4.1)	11(4.7)	21(4.4)	0.59
Western Food	27(11.0)	29(12.4)	56(11.7)	(3)
Chinese Food	28(11.4)	23(9.8)	51(10.6)	
Total	246(51.3)	234(48.8)	480(100.0)	

1) A broiled dish of sliced rice cake, meat, eggs, seasoning, etc.
2) NS: no significant

and 3.1% with more than 5 times, but 8.4% answered no family eating out. There was no significant difference between boys and girls in the frequency of eating out as 1~2 times a month, showing 72.1% and 70.7%, respectively. Korean food, particularly meat dishes, was the most favorite type of eating out in 73.6% of male students and 73.1% of female students, without any significant difference.

Cooking Method Preference

The preference for vegetables by cooking method, as shown in Table 8, showed that 43.3% of children preferred jeon or twigim method, followed by 22.1% of namul, 21.0% of bokeum, and 13.5% of saengchae. The preference for fish by cooking method showed that 32.8% of children favored twigim method, followed by 29.6% of gui, 21.6% of jorim or jjim, and 16,0% of guk or jjigae. The preference for meat by cooking method showed that 35.1% of children preferred twigim method, followed by 34.0% of bokeum, 19.1% of gui, 11.8% of jjim or jorim. Jang[24] reported in the study

Table 8. Cooking method of vegetables, fish and meat preferred

Variables	Male	Female	Total	x^2 (df)
Vegetables				
Namul(Seasoned vegetables)	53(20.0)	63(24.3)	116(22.1)	
Saengchae(Salads)	38(14.3)	33(12.7)	71(13.5)	2.06(3)
Bokeum(Panbroiling)	114(43.0)	50(19.3)	110(21.0)	ns[1]
Jeon, Twigim (Panfried foods, Frieds foods)	265(50.6)	113(43.6)	227(43.3)	
Total	265(50.6)	259(49.4)	524(100.0)	
Fish				
Jjim · Jorim(Steamed food, Hard boiled food)	56(21.1)	57(22.0)	113(21.6)	
Twigim(Frieds foods)	89(33.6)	83(32.0)	172(32.8)	0.26(3)
Gui(Grilled food)	79(29.8)	76(29.3)	155(29.6)	ns
Guk, Jjigae(Soup, Stew)	41(15.5)	43(16.6)	84(16.0)	
Total	265(50.6)	259(49.4)	524(100.0)	
Meat				
Jjim · Jorim(Steamed food, Hard boiled food)	30(11.3)	32(12.4)	62(11.8)	
Twigim(Frieds foods)	97(36.6)	87(33.6)	184(35.1)	0.56(3)
Gui(Grilled food)	50(18.9)	50(19.3)	100(19.1)	ns
Bokeum(Panbroling)	88(33.2)	90(34.7)	178(34.0)	
Total	265(50.6)	259(49.4)	524(100.0)	

1) NS: no significant

on the preference of meat dishes that twigim was a highly preferred method while jjim or jorim was not preferred, which was consistent with the result of this study.

3. Preference of Foods

Cooked Rice and One Dishes Food

The preference for rice group and one-dish foods, as in Table 9, showed that Ssalbap (4.31), Hyunmibap (3.64), and Boribap (3.52) were in the preferred rice group while Patbap was the least preferred, showing the high preference for Ssalbap over rice with mixed grains. These findings were consistent with other studies.[25-29]

The preference for one-dish foods showed that Jajangbap (4.18), Kimchibokeumbap (4.17), Bokeumbap (4.14), Curry rice (4.11), Hashed rice (4.02) and Chickenbap (4.02) as preferred foods, while Kongnamulbap (3.43) was the least preferred dish. The preference for Curry rice ($p<0.05$) and Chickenbap ($p<0.01$) was higher in boys than girls, showing the significant gender difference. Park[30] and Lee *et al.*[31] reported high preferences for Kimchibokeumbap, Jjajangbap, Curry rice and Hashed rice, and also low preference for Kongnamulbap, which was consistent with the result of this study.

Table 9. Preference of cooked rice and one dish foods

Kind	Male	Female	Total	t	p
Ssalbap(Cooked rice)	4.28±0.79[1)]	4.36±0.76	4.31±0.78	-1.18	0.240
Geomjeongkongbap(Cooked with black soybean)	3.06±0.97	2.90±0.97	2.98±0.97	1.85	0.064
Boribap(Boiled barley)	3.51±0.88	3.53±0.82	3.52±0.85	-0.21	0.833
Chasusubap(Cooked rice with glutinous sorghum)	3.31±0.89	3.30±0.85	3.30±0.87	0.06	0.953
Chajobap(Cooked rice with glutinous millet)	3.22±0.93	3.18±0.83	3.20±0.88	0.44	0.661
Yulmubap(Cooked rice with job's tears)	3.09±0.90	2.97±0.80	3.03±0.85	1.64	0.102
Hyunmibap(Boiled unclened rice)	3.62±0.99	3.65±0.83	3.64±0.91	-0.38	0.708
Patbap(Cooked rice with red bean)	2.62±0.86	2.63±0.86	2.62±0.86	-0.14	0.890
Geomjeongssalbap(Cooked black rice)	3.19±1.00	3.27±0.93	3.23±0.96	-0.93	0.356
Nokdubap(Boiled mung bean)	2.78±0.89	2.74±0.86	2.76±0.88	0.52	0.603
Total	3.27±0.59	3.25±0.52	3.26±0.56	0.29	0.769
Hashed rice(Hashed rice)	3.99±1.07	4.04±1.00	4.02±1.04	0.51	0.610
Curry rice(Curry rice)	4.21±0.94	4.02±0.98	4.11±0.97	2.33*	0.020
Chickenbap(Cooked rice with chicken)	4.14±1.04	3.90±1.10	4.02±1.08	2.61**	0.009
Kimchibokeumbap(Frizzled rice with kimchi)	4.24±0.93	4.10±0.99	4.17±0.96	1.59	0.113
Kongnamulbap(Cooked rice with soybean sprout)	3.40±1.12	3.46±1.14	3.43±1.13	-0.56	0.573
Japchaebap(Mixed rice with vegetzable and beef rice)	3.57±1.17	3.58±1.14	3.57±1.15	-0.05	0.957
Bibimbap(Boiled rice with assorted mixtures)	3.88±1.01	3.78±1.10	3.83±1.06	1.12	0.264
Jjajangbap(Rices with blackish bean sauce)	4.22±1.04	4.15±0.92	4.18±0.98	0.80	0.425
Bokeumbap(Frizzled rice with vegetable)	4.17±0.92	4.11±0.91	4.14±0.92	0.77	0.441
Total	3.98±0.63	3.90±0.64	3.94±0.64	1.40	0.163

1) Mean±SD
*p<.05, **p<.01

Table 10. Preference of guk, jjigae and tang

Kind	Male	Female	Total	t	p
Doenjangguk(Beanpaste soup)	3.34±0.99[1)]	3.38±0.94	3.36±0.97	-0.55	0.582
Miyeokguk(Seaweed soup)	3.78±0.89	3.78±0.87	3.78±0.88	0.02	0.987
Soegogimiyeokguk(Beef seaweed soup)	3.88±0.97	3.75±0.97	3.81±0.97	1.45	0.148
Soegogimuguk(Beef radish soup)	3.76±1.00	3.67±1.04	3.72±1.02	1.01	0.312
Dalgyalpaguk(Egg welsh onion soup)	3.30±0.95	3.24±0.95	3.27±0.95	0.76	0.451
Gamjaguk(Potato soup)	3.31±0.99	3.32±0.89	3.31±0.94	-0.04	0.967
Kongnamulguk(Bean sprouts soups)	3.46±0.88	3.44±0.82	3.45±0.85	0.38	0.707
Eomukguk(Boiled fish paste soup)	3.22±0.98	3.17±0.95	3.19±0.96	0.58	0.560
Ojingeomuguk(Squid radish soup)	2.98±0.99	3.00±0.90	2.99±0.95	-0.28	0.784
Samgyetang(Ginseng chicken soup)	3.71±0.90	3.54±0.86	3.62±0.89	2.19*	0.029
Haemultang(Marine products soup)	3.20±0.97	2.98±0.95	3.09±0.97	2.56*	0.011
Sundubujjigae(Uncurdled bean curd pot stew)	3.61±0.83	3.65±0.71	3.63±0.78	-0.67	0.507
Kongbijijjigae(Beans bean-curd refuse pot stew)	2.86±0.95	3.07±0.90	2.96±0.93	-2.54*	0.011
Budaejjigae(Mixed stew)	3.71±0.95	3.66±0.82	3.68±0.89	0.69	0.492
Dongtaehjjigae(Frozen pollack pot stew)	2.87±0.85	2.76±0.85	2.81±0.85	1.45	0.147
Ojingeojjigae(Squid stew)	3.08±0.93	3.16±0.86	3.12±0.89	-0.96	0.335
Chamchikimchijjigae(Tuna kimchi stew)	3.75±0.88	3.85±0.75	3.80±0.82	-1.43	0.152
Doenjangjjigae(Bean paste pot stew)	3.42±0.90	3.51±0.86	3.47±0.88	-1.80	0.238
Yukgaejang(Hot shredded beef soup)	3.56±0.90	3.33±0.89	3.44±0.90	2.94**	0.003
Seolreongtang(Beef soup)	3.82±1.02	3.66±0.96	3.74±0.99	1.79	0.074
Dwaejippyeogamjatang(pig bone potato soup)	3.49±0.89	3.54±0.89	3.51±0.89	-0.59	0.553
Total	3.43±0.47	3.40±0.46	3.42±0.46	0.76	0.448

1) Mean±SD
*p<.05, **p<.01

Guk, Jjigae and Tang

The preference for guk, tang, and jjigae, as in Table 10, showed that Soegogimiyeokguk (3.81), Chamchi-kimchijjigae (3.80), Miyeokgik (3.78), Seolreongtang (3.74), Soegogimuguk (3.72) and Budaejjigae (3.68) were highly preferred, while Ojingeomuguk (2.99), Kongbiji-jjigae (2.96), and Dongtaejjigae (2.81) were the least preferred foods. The preference for Samgyetang ($p<0.05$), Haemultang ($p<0.05$) and Yukgaejang ($p<0.01$) was significantly higher in boys than in girls. Also, the preference for Kongbijijjigae was significantly higher in girls than in boys ($p<0.05$).

These results suggested that male students preferred Samgyetang, Haemultang and Yukgae-jang and female students preferred Kongbijijjigae, when compared with the opposite gender.

Jjim and Jorim

The preference for jjim and jorim group is presented in Table 11, in which Dwaejigalbijjim (4.37), Dakjjim (3.90), Dwaejigogijangjorim (3.87) were highly preferred while Kongjorim (2.90) was the least preferred food. Also Yim *et al.*,[25] Park,[30] and Kim[27] reported that Galbijjim was the most preferred food in the group, which was consistent with the result of this study.

Table 11. Preference of jjim and jorim

Kind	Male	Female	Total	t	p
Dwaejigalbijjim (Sesamed pig short-ribs)	4.36±0.78[1]	4.37±0.78	4.37±0.78	-0.12	0.902
Dalgyaljjim (Sesamed egg)	3.52±0.90	3.61±0.85	3.57±0.88	-1.12	0.265
Mechurialjangjorim (Hard-boiled with mallet beef flank egg)	3.62±0.95	3.54±0.88	3.58±0.92	0.93	0.354
Kongjorim (Hard-boiled with beans)	2.92±0.93	2.88±0.85	2.90±0.89	0.62	0.537
Algamjajorim (Hard-boiled with potato)	3.16±0.90	3.27±0.80	3.21±0.86	-1.40	0.163
Dakjjim (Hard-boiled with chicken)	3.88±0.86	3.92±0.74	3.90±0.80	-0.62	0.535
Dwaejigogijangjorim (Hard-boiled with pork)	3.86±0.83	3.88±0.73	3.87±0.79	-0.23	0.815
Total	3.62±0.54	3.64±0.47	3.63±0.50	-0.44	0.662

1) Mean±SD

Bokeum, Twigim and Jeon

The preference for bokeum, twigim, and jeon group, as in Table 12, showed that Dwaejigogi-bokeum (4.16) and Tteokbokeum (4.16) were highly preferred while Beoseotbokeum (2.79) and Maneuljjongbokeum (2.75) were the least preferred, which were consistent with the

Table 12. Preference of bokeum, twigim and jeon

Kind	Male	Female	Total	t	p
Dwaejigogibokeum(Pork roast meat)	4.15±0.87[1]	4.17±0.75	4.16±0.91	-0.16	0.873
Myeolchibokeum(Panbroiling anchovy)	3.39±0.92	3.37±0.90	3.38±0.91	0.33	0.747
Maneuljjongbokeum(Panbroiling with garlic trunk)	2.71±0.89	2.79±0.90	2.75±0.89	-1.05	0.294
Ojingeobokeum(Panbroiling with squid)	3.44±0.92	3.54±0.80	3.49±0.86	-1.32	0.189
Tteokbokeum(Seasoned bar rice cake)	4.13±0.84	4.20±0.75	4.16±0.80	-1.04	0.300
Japchae(Panbroiling with mixed dish of vegetables and beef)	3.65±0.87	3.72±0.90	3.69±0.89	-0.84	0.400
Gogumajulgibokeum(Panbroiling with sweet patato trunk)	2.91±0.88	3.00±0.88	2.96±0.88	-1.22	0.221
Beoseotbokeum(Panbroiling with mushroom)	2.80±0.99	2.79±0.94	2.79±0.96	0.15	0.884
Total	3.40±0.48	3.45±0.46	3.42±0.47	-1.18	0.240
Gogumatwigim(Fried sweet potato with syrup)	3.82±0.90	3.87±0.78	3.84±0.84	-0.73	0.465
Saengseontwigim(Fried fish)	3.34±1.02	3.25±0.96	3.29±0.99	1.07	0.285
Baengeopotwigim(Fried whitebait)	2.86±0.90	2.83±0.82	2.85±0.86	0.51	0.613
Porkcutlet(Pork cutlet)	4.49±0.70	4.40±0.77	4.45±0.74	1.39	0.167
Tangsuyuk(Fried pork with sweet and sour sauce)	4.34±0.67	4.20±0.77	4.27±0.72	2.15*	0.032
Porkchap(Pork chap)	3.18±0.95	3.05±0.87	3.12±0.91	1.55	0.121
Daktwigim(Fried chicken)	4.26±0.82	4.03±0.97	4.15±0.90	2.93**	0.004
Total	3.75±0.48	3.66±0.48	3.71±0.48	2.22*	0.027
Haemulpajeon(Fried marine products welsh onion)	3.09±0.98	3.09±0.98	3.08±0.98	0.02	0.984
Nokdujeon(Pan fried mungveans)	2.87±0.93	2.87±0.83	2.87±0.88	0.04	0.969
Aehobakbuchujeon(Fried young pumpkin)	2.88±0.97	2.88±0.88	2.88±0.92	-0.11	0.914
Dalgyalmali(Egg role)	3.87±0.96	3.89±0.88	3.88±0.92	-0.20	0.839
Dubujeon(Fried bean curd)	3.26±0.94	3.36±0.90	3.31±0.92	-1.23	0.221
Total	3.19±0.68	3.22±0.89	3.21±0.92	-0.30	0.79

1) Mean±SD
*p<.05, **p<.01

Table 13. Preference of muchim and kimchi

Kind	Male	Female	Total	t	p
Sukjunamulmuchim(Green-bean sprouts herbs)	2.80±0.85[1)]	2.69±0.81	2.74±0.83	1.51	0.133
Oisaengchae(Seasoning with cucumber)	3.12±0.99	3.20±0.91	3.16±0.95	-1.01	0.312
Cheongpomukmuchim (Seasoning with mung-bean jelly)	2.99±0.95	2.95±0.92	2.97±0.93	0.57	0.569
Chwinamulmuchim (Seasoning with fragrant edible wild aster herbs)	2.71±0.87	2.69±0.86	2.70±0.86	0.29	0.769
Musaengchae (Radish vegetables right before eating)	2.84±0.91	2.83±0.85	2.84±0.88	0.15	0.882
Sigeumchinamul(Spinach herbs)	3.09±1.01	3.11±0.94	3.10±0.97	-0.21	0.836
Ssukgatnamulmuchim(Crown daisy herbs)	2.52±0.81	2.39±0.65	2.46±0.74	2.10*	0.036
Kongnamulmuchim(Seasoning with bean sprouts)	3.28±0.97	3.39±0.86	3.33±0.92	-1.38	0.167
Golbangimuchim(Seasoning with golbaengi)	3.34±1.03	3.28±0.99	3.31±1.01	0.70	0.486
Total	2.97±0.64	2.95±0.58	2.96±0.61	0.36	0.718
Baechukimchi(Korean cabbage kimchi)	3.86±0.75	3.78±0.70	3.82±0.73	1.27	0.205
Yeolmukimchi(Young radish kimchi)	3.45±0.90	3.46±0.77	3.45±0.73	-0.04	0.970
Kkakdugi(Radish cube kimchi)	3.38±0.95	3.38±0.89	3.38±0.92	0.03	0.973
Oikimchi(Stuffed cucumber kimchi)	3.44±1.02	3.54±0.88	3.49±0.96	-1.14	0.254
Chonggakkimchi(Picked young radishes)	3.37±0.94	3.36±0.85	3.37±0.89	0.14	0.892
Total	3.50±0.65	3.50±0.59	3.50±0.62	-0.02	0.988

1) Mean±SD
*p<.05

result of the study by Kim.[27)]

The preference for twigim showed that Pork cutlet (4.45), Tangsuyuk (4.27) and Daktwigim (4.15) were highly preferred while Baengeopo-twigim (2.85) was the least preferred.

Park[30)] reported in the preference study for twigim foods that Pork cutlet was the most preferred twigim food, followed by Daktwigim, Gogumatwigiml, and Saengseontwigim, which was consistent with the result of this study. Yim *et al.*[25)] reported higher preference for Porkcutlet and Daktwigim, which was also consistent with the result of this study. The preference for Tangsuyuk ($p<0.05$) and Daktwigim ($p<0.01$) was significantly higher in boys than in girls.

The preference for jeon group showed that Dalgyalmali (3.88) and Dubujeon (3.31) were highly preferred while Nokdujeon (2.87) was the least preferred. Yim *et al.*[25)] and Kim[27)] also reported higher preference for Dalgyalmali, which was consistent with the result of this study.

Muchim and Kimchi

The preference for muchim and Kimchi group is presented in Table 13, in which Kongnamul-muchim (3.33) and Golbaengimuchim (3.31) were highly preferred, while Ssukgatnamulmuchim (2.46) was the least preferred. These findings were consistent with the result in the study by Park[30)] in which Kongnamul was the most prefe-rred and then followed by Golbaengi, Oisaengchae, Musaengchae, and Sukjunamul. The preference by gender showed that the preference for Ssukgatnamul-muchim ($p<0.05$) was significantly higher in boys than in girls.

The preference for Kimchi group showed that Baechukimchi (3.82) was the most preferred Kimchi while Chonggakkimchi (3.37) was the least preferred.

In the study of Park,[30)] the preference for Baechukimchi was the highest, which was consistent with the result of this study, and then followed by Ggakdugi, Yeolmukimchi, Chonggakkimchi, and Oikimchi, which was not consistent wit the result of this study.

Desserts

The preference for desserts is shown in Table 14, in which Yogurt (4.22) was the most preferred while Tteok (3.71) was the least preferred. The preference for yogurt was significantly higher ($p<0.01$) in boys than in girls, which was consistent with the result of Kim *et al.*.[27)]

Table 14. Preference of dessert

Kind	Male	Female	Total	t	p
Fruit	4.26±0.82[1)]	4.17±0.60	4.22±0.72	1.38	0.167
Yogurt	4.35±0.75	4.14±0.61	4.24±0.69	3.49**	0.001
Tteok(Rice cakes)	3.69±0.87	3.73±0.74	3.71±0.81	-0.45	0.655
Ppang(Breads)	3.91±0.83	3.82±0.72	3.86±0.78	1.22	0.222
Total	4.05±0.60	3.97±0.49	4.01±0.55	1.81	0.071

1) Mean±SD
**p<.01

CONCLUSION

The purpose of this study was to investigate the food preference and dietary behaviors of elementary school children, who were in a period of active physical and mental growth and the development of social nature, and to provide valuable data for nutritional education programs and school lunch planning. The study on the food preference and dietary behaviors of elementary students of higher grades in Gyeonggi area was performed by using survey questionnaire and the statistical analysis was performed using SPSS with x^2 verification and t-test.

The analysis results were summarized as below.

1. For the obesity index, the overweight group included more boys (52.5%) than girls (47.5%) and more 5th and 6th grade students with 34.4% and 35.0%, respectively, than 4th grade students with 30.6%. The normal weight group included more 4th grade students with 35.4% than 5th and 6th grade students with 33.3% and 31.3%, respectively. The overweight group had significantly higher values in height, weight, BMI, RI, and OI than other two groups. The correlations among anthropometric measurements showed that there were positive correlations ($p<0.001$) between weight and height, between RW and height and weight, between BMI and height, weight and RW, between OI and height, weight, RW, and BMI, and also between RI and weight, RW, BMI and OI.

2. 43.9% of children had 4~6 dinners a week with their family and the most pleasant meal was dinner. The majority of children spent 11~20 minutes of eating time and boys ate significantly rapidly than girls ($p<0.001$). Most students had a moderate amount of food at meal time and showed the tendency of reading books or watching television while eating their meals. Snack was consumed 2~3 times a day, with the preference principally for ice-cream and cookies. The frequency of eating out was 1~2 times in a month and most of subjects preferred Korean style cuisine. Preferred cooking method by children was twigim for vegetables, fish and meat.

3. The food preference study showed that Ssalbap was the most preferred food in the rice group and Patbap was the least preferred. For one-dish foods in the rice group, Jjajangbap, Kimchibokeumbap, Bokeumbap, Curry rice, Hashed rice and Chickenbap were preferred, with the tendency of boys who liked significantly more Curry rice ($p<0.05$) and Chickenbap ($p<0.01$) than girls did. The preference for guk, jjigae, and tang group showed that Soegogimiyeokguk was the most preferred food and Kongbijijjigae was the least preferred food. Boys preferred significantly more Samgyetang ($p<0.05$), Haemultang ($p<0.05$) and Yukgaejang ($p<0.01$) than girls, while girls preferred significantly more Kongbijijjigae than boys ($p<0.05$).

The preference for jjim and jorim group showed that Dwaejigalbijjim was the most preferred food and Kongjorim was the least preferred food. The preference for bokeum group showed that Dwaejigogibokeum was the host preferred food and Maneuljjongbokeum was the least preferred food. The preference for twigim group, Porkcutlet was the most preferred food which was followed by Tangsuyuk and Daktwigim, while Baengeopotwigim was the least preferred food. Also, boys preferred significantly more Tangsuyuk ($p<0.05$) and Daktwigim ($p<0.01$) than girls, and the overall tendency showed that boys preferred twigim foods than girls ($p<0.05$). In case of jeon group, Dalgyalmali was the most preferred food and Nokdujeon was the least preferred. The preference for muchim group showed that Kongnamulmuchim was the most preferred food and Ssukgatnamulmuchim was the least preferred, but boys liked Ssukgatnamulmuchim significantly more than girls ($p<0.05$). In Kimchi group, Baechukimchi was the most preferred kimchi and Chonggakkimchi was the least preferred.

Yogurt and fruits were the most preferred desserts while Tteok was the least preferred. Also, boys preferred yogurt significantly more than girls ($p<0.01$).

Developement of cooking methods concerning about food preferences of children will be needed.

Literature Cited

1) Lee HS, Jeong WS, Park UI. The dietary behaviorobese and normal weight elementary children with maternal guidance for their dietary behavior. *Korea J Comm Nutr* 8(6):831-839, 2003
2) Birch I. The role of experience in children's food acceptance patterns, *J Am Diet Assoc* 87(supp.9):536, 1987
3) Kim EK. A comparison of the past physical growth, eating habits and dietary intake by obesity index of sixth grade primary school students in seoul. *Korea J Comm Nutr* 6(3): 475-485, 2000
4) Yu JS, Choi YJ, Kim IS, Jang KJ, Chon JH. A Study on prevalence of obesity, eating habits and life styles of 5th grade students in Inchon. *Korea J Comm Nutr* 2(1):13-22, 1997
5) Durant RH, Lin CW. An evaluation of five indexes of relatice body weight for use with children. *J Am Diet Assoc* 78:35-41, 1991
6) Holly, Robert TB. Growth and development: physical, mental, and social aspects. *Adolescent Medicine* 1:1998
7) Park HS, Ahn SH. Eating habits and social behavior in Korean preschool children. *Korea J Nutr* 36(3):298-305, 2003
8) Kim GN, Mo SU. A study of children's dietary habits, focusing on parental influences, *Korea J Nutr* 9(1):25-43, 1976
9) Lee KS, Yu YS. The dietary behavior and nutrient intake status of the yooth in rural areas of Korea. *Korea J Comm*

Nutr 2(3):294-304, 1997
10) Joo EJ, Kim IS, Kim YS, Seo EA. Determining the frequency of obesity and eating habits of older(4th, 5th, 6th grade) elementary school students in Iksan city by some obesity indices. *Korea J Comm Nutr* 6(1):16-27, 2001
11) Hong WS, Chan HJ. The relationship between food service satisfaction and plate wastes in elementary school students. *Korean J Soc Food Cookery Sci* 19(3):390-395, 2003
12) Paik JJ, Lee HS. Dietary behaviors, food preferences and its relationships with presonality traits in sixth grader's of elementary school. *Korea J Comm Nutr* 9(2):135-141, 2004
13) Lee BS. A comparative study on dietary life and recognition of diet related factors in elementary, middle and high school students. *J Korea Diet Assoc* 10(3):364-374, 2004
14) Kim EY. A Study on eating habit and food preference of elementary school students in higher grade. Graduate School of Kyunghee University, Korea, 2003
15) Choe JS, Ji SM, Paik HY, Hong SM. A study on the eating habits and dietary consciousness of adults in Urban area. *J Korean Soc Food Sci Nutr* 32(7):1132-1146, 2003
16) Lee MA. study on status of dietary behavior by school children of elementary school. Graduate School of Sookmyung Women's University, Korea, 1996
17) Kim JH, Ahn HJ, Lee SE. Body composition food intake and clinical blood Indices of female college students. *Korea J Comm Nutr* 8(6):977-985, 2003
18) Kwon SJ. Effect of obesity on the satisfaction with school lunches and the behavior of leaving lunch food in elementary school children, *Korea J Comm Nutr* 6(2):139-149, 2001
19) Sung CJ, Sung MK, Choi MK, Kim MH, Seo YL, Park ES, Baik JJ, Seo JS, Mo SM. Comparison of the food nutrition ecology of elementary school children by regions. *Korea J Comm Nutr* 8(5):642-651, 2003
20) Kim KH. A study of the dietary habits the nutritional knowledge and the consumption patterns of convenience foods of university students in the Gwangju area. *Korea J Comm Nutr* 8(2):181-191, 2003
21) Park MH, Choi YS, Kim YJ. Comparison of dietary attitudes and attitudes to the school lunch service of elementary and middle school students living in the same region. *Korea J Comm Nutr* 7(1):3-13, 2002
22) Chang HS, Kim MR. The change on food habits of girl students living in Jeonbuk region. *Korea J Comm Nutr* 4(3): 366-374, 1999
23) Hwang KJ, Lee KH. The effect of obesity and nutrient intake on serum IGF-1 and serotonin levels in school children. *Korea J Nutr* 35(5):524-530, 2002
24) Jang SH. A study on food habits and food preferences of the elementary school children. Graduate School of Korean National University of Education, Korea, 1997
25) Yim KS, Lee TY. Menu analysis of the national school lunch program: The comparisons of the frequency of menu with the student's food preferences. *J Korea Diet A ssoc* 4(2): 176-188, 1998
26) Park MH, Choi YS, Kim YJ. Comparisons of food preference and nutrient intake of students of elementary school and middle school providing school food service in Nam Jeju Gun. *J Korea Diet Assoc* 10(3):342-358, 2002
27) Kim KA, Kim SJ, Jung LH, Jeon ER. Meal preference on the school food service of middle school students in Gwangju and Chollanamdo area. *Korean J Soc Food Cookery Sci* 19(2): 144-154, 2003
28) Koo NS, Park CI. Food preference of elementary school children under meal service in Taejon. *Korea J Comm Nutr* 3(3):440-453, 1998
29) Choi YS, Yoo YJ, Kim JG, Nam SM, Jung MJ, Chung CK. Food preferences and nutrient intakes of college students in Kangwon province. *J Korean Soc Food Sci. Nutr* 30(1): 175-182, 2001
30) Park HJ. A Study on dietary habit, food preference and dietary intake of primary school students in Gwangju. Graduate School of Chonnam National University, Korea, 2002
31) Lee YJ, Chang KJ. Preliminary study on the establishment of proper portion using consumed size and food preference of frequently served meals in the elementary school lunch program inInchon. *J Korea Diet Assoc* 4(2):12-131. 1998