

A Study on the Characteristics in Lifestyle, Eating Habits and Food Preferences of Overweight and Obese Children in Pocheon Area

Hongmie Lee,[†] Kyungsuk Choi

Department of Food and Nutrition, Daejin University, Pocheon, Korea

ABSTRACT

This study was undertaken with 542 fifth-grade elementary school children to investigate the characteristics in lifestyle, eating habits, food preferences of overweight and obese children in the Pocheon area of Korea. Anthropometry was conducted to determine obesity, and data was obtained on lifestyle, eating habits and food preferences by using questionnaires. The prevalence rate of obesity was 19.5% for boys and 8.5% for girls, and 14.3% of boys and 14.4% of girls were overweight. No significant differences were found in the body size and education years of parents, family income and the employment status of mother. Boys did not show any significant difference between subgroups in lifestyle, eating habits and food preferences. Obese girls watched TV longer and liked physical education less than normal and overweight groups, suggesting that an inactive lifestyle can be related to girls' obesity in this study. Overweight girls answered that they had significantly lower preferences for empty-calorie foods such as candies/caramels and cookies as well as high-fat foods such as samgyupsal(pork belly) than normal weight girls, implicating the fear of obesity for overweight girls, although more studies should be done including an assessment of actual intake of these foods. The preferences of obese girls for these foods were not higher than those of normal-weight girls, suggesting that the preference for certain foods may not be the characteristic of obese girls in this study. A special program for nutritional education with a different focus should be developed to combat the problems of each subgroup depending on gender and obesity status to improve the physical fitness of the children in this area. (*J Community Nutrition* 1(1) : 10~15, 1999)

KEY WORDS : obesity · elementary school children · lifestyle · eating habits · food preferences.

Introduction

Obesity has become an important health issue nationwide resulting from westernized food, modernized transportation and lowered activity level as the Korean economy grows. Especially, the childhood obesity rate in Korea has increased dramatically during the last 10 years (Kang et al. 1997 ; Moon et al. 1992). The obesity rate of elementary schoolboys in an urban area, for example, rose from 9.5% in 1986 to 19.7% in 1996 (Kang et al. 1997). Obesity in childhood has several implications in children's lives such as lack of self-confidence, poor achievement in schoolwork, and future adult health problems including diabetes and cardiovascular diseases (Kim et al. 1998 ; Lee

1994 ; Pfanner & Marchesch 1992). Several recent studies have indicated that the prevalence of risk factors leading to coronary artery disease in children was increasing (Kim et al. 1992 ; Yang 1994), and the serious medical problems such as fatty liver, hyperlipidemia, hypercholesterolemia were also found in highly obese children (Kim et al. 1996 ; Lee 1994). In the case of juvenile-onset obesity, it is more difficult to lose weight and maintain it than adult-onset obesity because the increased number of adipose cells accompanying juvenile-onset obesity may increase the body's resistance to reducing fat stores. Moreover, it is clear that the more longstanding the obesity, the more difficult it is to treat the problem. Therefore, the importance of preventing childhood obesity through intervention programs should be emphasized. For the program to be effective, the basic information such as risk factors promoting obesity should be provided. Generally, childhood obesity is associated with obese parents, a higher socioeconomic status, increased parental education, smaller family size and a sedentary lifes-

[†]Corresponding author : Hongmie Lee, Department of Food & Nutrition, Daejin University, Pocheon-Gun, Kyeonggi-Do 487-800, Korea

Tel : 0357) 539-1862, Fax : 0357) 539-1860

E-mail : hmlce@road.daejin.ac.kr

tyl(Klish 1995). And genetics and certain dietary practice have also been considered to play a role. They are not factors that can be controlled by intervention program for obesity prevention except dietary practice and lifestyle.

Therefore, eating habits and daily lifestyle associated with childhood obesity have been intensively studied(Ch-eong et al. 1997 ; Lee & Oh 1997 ; Park et al. 1998 ; You et al. 1997). Considering that food habits and lifestyle are influenced by many environmental factors according to area, their own problems in the aspects relating to obesity should be analyzed in each area prior to the development of an intervention program. Therefore, this study was undertaken to investigate the characteristics in lifestyle, eating habits and food preferences of overweight and obese children by comparing them to those of normal-weight children by gender from the fifth grade elementary school children of Pocheon area in order to provide the basic information for the development of a special program for nutritional education to improve the physical fitness of the children in this area.

Subjects and Methods

1. Subjects

Subjects for this study were boys(n=272) and girls(n=270) from the fifth grade of the three public elementary school in Pocheon-gun, Kyeonggi-do. The anthropometric measurement and questionnaire examination were conducted from July through September, 1998.

2. Measurements

A new electrode method for multifrequency bioelectrical impedance analysis has been conducted using eight tactile electrodes to estimate heights, weights, WHR(waist to hip ratio) and % body fat by a commercial multifrequency segmental impedance analyzer(Inbody 2.0, Biospace Co. Ltd, Seoul, Korea). According to their percent ideal body weight, boys and girls were then divided into a normal(90-110%), overweight(110-120%) and obese

($>120\%$) subgroups. Ideal body weight was defined by the standard weight for the height of the Korean children (Korean association of pediatrics 1985).

Data was obtained on lifestyle, eating habits and preferences for some foods by using a questionnaire which was completed by the children. The questionnaire on lifestyle estimated the average time spent sleeping and watching TV, and preference for physical education. Information regarding eating habits consisted of the questions on meal regularity, frequency of snacking, eating speed, eating breakfast, sleeping when hungry, preference for salty taste and chewing before swallowing.

3. Statistical analysis

The spss/pc program(SPSS 1986) was used to examine the association of variables in this study. Comparison of the values between subgroups was done by the ANOVA test and Duncan's Multiple Range Test and categorical data was analyzed with the Chi-square test.

Results and Discussion

Table 1 shows that the prevalence rate of obesity was 19.5% for boys and 8.5% for girls, and 14.3% of boys and 14.4% of girls were overweight. Comparing to the rate of obesity in fifth-grade schoolboys which was 18.2-31.2% (Kim et al. 1998 ; You et al. 1997), the proportion of obesity in this area tends to be higher in boys but lower in girls.

In Table 2, overweight and obese children have significantly higher weight, WHR and % body fat than normal children in each gender group. The height showed little differences in girls but significant differences in boys between subgroups, namely the fatter, the taller.

Childhood obesity is associated with higher education

Table 1. Obesity distribution by gender N(%)

	Underweight	Normal	Overweight	Obese	Total
Boys	28(10.3)	152(55.9)	39(14.3)	53(19.5)	272(100.0)
Girls	72(26.7)	136(50.4)	39(14.4)	23(8.5)	270(100.0)
Total	100(18.5)	288(53.1)	78(14.4)	76(14.0)	542(100.0)

Table 2. Anthropometric measurements in subjects

	Boys			Girls		
	Normal(152)	Overweight(39)	Obese(53)	Normal(136)	Overweight(39)	Obese(23)
Height(cm)	141.5 \pm 5.84 ^{ai}	143.5 \pm 6.13 ^{ai}	146.1 \pm 6.02 ^b	143.4 \pm 7.04 ^a	143.8 \pm 7.81 ^a	142.9 \pm 6.60 ^a
Weight(kg)	33.2 \pm 4.25 ^a	39.9 \pm 5.03 ^b	50.2 \pm 7.14 ^c	36.2 \pm 6.84 ^a	42.3 \pm 8.27 ^b	46.3 \pm 8.00 ^c
WHR%	82.6 \pm 2.1 ^a	85.1 \pm 2.0 ^b	90.1 \pm 3.6 ^c	77.8 \pm 2.2 ^a	81.0 \pm 2.1 ^b	84.7 \pm 2.4 ^c
Fat%	17.1 \pm 3.7 ^a	24.0 \pm 3.7 ^b	33.5 \pm 4.7 ^c	21.3 \pm 4.6 ^a	29.0 \pm 4.2 ^b	33.9 \pm 4.07 ^c

1) Mean \pm S.D. Values with different superscripts are significantly different within obesity subgroup at $p < 0.05$.

level of parents and higher socioeconomic status(Klish 1995). However, in the present study, there was no significant difference between subgroups in the body size and the education years of their parents, family income, and the possession of a job/career of mother(data not shown). These results are consistent to those of Park et al.(1998) reporting that obesity was not correlated to mother's education level or employment status.

Physical activity energy expenditure can be accurately assessed by the equation including total energy expenditure(TEE)and resting metabolic rate(RMR)which are measured by doubly labeled water method and indirect calorimetry, respectively(Salbe et al. 1997). In this study, average time spent sleeping and watching TV and preference for physical education were determined to assess activity in lifestyle indirectly, although they may have some limitations to be used as the most accurate indices for the activity in lifestyle.

Comparison between subgroups on the average time spent watching TV showed little difference in boys but a significant difference in girls, namely obese girls watched TV longer than normal and overweight girls did(Table 3). Several studies(Cheong et al. 1997 ; Lee & Oh 1997)have also reported no significant difference in time spent in TV watching between obese and normal children. Table 3 also showed that obese girls but not the overweight girls liked the physical education less than normal girls did. Our results showed that inactivity might be the characteristic in the lifestyle of the obese girls in this study and were

consistent to the report by Klish(1995)that childhood obesity was associated with a sedentary lifestyle. Inactive lifestyle in obese girls, but not in obese boys, observed in the present study make it necessary to emphasize the importance of different focuses in intervention programs to improve the physical fitness of boys and girls.

The average time spent sleeping was not significantly different between subgroups according to the obesity status in both gender groups. Other studies also found no significant difference in time spent sleeping(Cheong et al. 1997 ; Kang & Paik 1983 ; Park et al. 1998)between obese and normal children, while Kim et al.(1993)reported a negative correlation between the obesity and the average time spent sleeping.

Eating habits associated to childhood obesity reported by other researchers(Lee & Oh 1997 ; Park et al. 1998 ; You et al. 1997)were overeating, prejudice for special food, rapid eating rate, more frequent skipping breakfast, increased preference for salty taste and irregular meals. Table 4 shows the results of the eating habits of the subjects in this study. Whereas there was no significant difference in the number of boys who responded to the questions on sleeping when hungry, more overweight and obese girls answered that they slept well when hungry than normal girls did. No significant difference was found between subgroups in aspects of meal regularity, frequency of snacking, eating speed, eating breakfast, preference for salty taste and chewing before swallowing.

Table 5 shows the results of the questionnaire on the

Table 3. Average time spent in sleeping and watching TV and preference for physical education

	Boys			Girls		
	Normal	Overweight	Obese	Normal	Overweight	Obese
<u>Sleeping(minuates)</u>						
	522.0±65.4 (151)	1502.0±84.8 (39) n.s. ²⁾	516.7±74.3 (53)	528.5±51.4 (136)	514.3±46.2 (37) n.s.	522.3±60.0 (23)
<u>TV watching(hours)</u>						
<1	14(9.3) ³⁾	3(7.7)	2(3.8)	13(9.6)	3(7.7)	1(4.3)
1 - 2	43(28.7)	13(33.3)	12(22.6)	36(26.5)	13(33.3)	4(17.4)
3 - 4	93(62.0)	32(59.0) n.s.	39(73.6)	87(63.9)	23(59.0) p=0.039*	18(78.3)
<u>Preference for physical education</u>						
Like a lot	94(62.7)	20(51.3)	25(47.2)	45(33.1)	7(17.9)	6(27.3)
Like	33(22.0)	12(30.8)	13(24.5)	38(27.9)	13(33.3)	3(13.6)
Average	17(11.3)	4(10.3)	11(20.8)	33(24.3)	18(46.2)	9(40.9)
Dislike	4(2.7)	1(2.6)	2(3.8)	15(11.0)	1(2.6)	3(13.6)
Dislike a lot	2(1.3)	1(2.6) n.s.	2(3.8)	5(3.7)	0(0.0) p=0.016*	1(4.5)

1) Values are mean±S.D.(number of subjects), 2) Not significantly different at $p<0.05$, 3) Number of subjects(%)
ns : not significantly difference

Table 4. Eating habits by gender and obesity status

	Boys				Girls			
	Normal	Overweig	Obese		Normal	Overweigh	Obese	
<u>Meal regularity</u>								
Very regular	48(31.6) ¹⁾	11(28.2)	14(26.4)		48(31.6) ¹⁾	11(28.2)	11(47.8)	
Slightly regular	51(33.6)	14(35.9)	18(34.0)		51(33.6)	10(25.6)	4(17.4)	
Moderate	44(28.9)	9(23.1)	16(30.2)	n.s. ²⁾	47(34.6)	15(38.5)	5(21.7)	n.s.
Slightly irregul	7(4.6)	2(5.1)	4(7.5)		14(10.3)	3(7.7)	2(8.7)	
Very irregular	2(1.3)	3(7.7)	1(1.9)		4(2.9)	0(0.0)	1(4.3)	
<u>Snacking</u>								
4/day	25(16.4)	9(23.1)	12(22.6)		13(9.6)	6(15.4)	4(17.4)	
3/day	72(47.4)	16(41.0)	22(41.5)		61(44.9)	16(41.0)	10(43.5)	
2/day	40(26.3)	9(23.1)	10(18.9)	n.s.	39(28.7)	12(30.8)	8(34.8)	n.s.
1/day	12(7.9)	4(10.3)	7(13.2)		19(14.0)	3(7.7)	0(0.0)	
Never	3(2.0)	1(2.6)	2(3.8)		4(2.9)	2(5.1)	1(4.3)	
<u>Eating speed</u>								
Very fast	11(7.2)	5(12.8)	6(11.3)		6(4.4)	3(7.7)	3(13.0)	
Slightly fast	54(35.5)	11(28.2)	18(34.0)		29(21.3)	8(20.5)	5(21.7)	
Moderate	69(54.4)	19(48.7)	26(49.1)	n.s.	71(52.2)	21(53.8)	12(52.2)	n.s.
Slightly slow	13(8.6)	3(7.7)	2(3.8)		27(19.9)	6(15.4)	2(8.7)	
Very slow	5(3.3)	1(2.6)	1(1.9)		3(2.2)	1(2.6)	1(4.3)	
<u>Eat breakfast</u>								
Always	109(71.7)	27(69.2)	30(56.6)		78(57.4)	21(53.8)	14(60.9)	
Sometimes	29(19.1)	8(20.5)	15(28.3)	n.s.	40(29.4)	9(23.1)	6(26.1)	n.s.
Rarely	9(5.9)	2(5.1)	5(9.4)		11(8.1)	8(20.5)	3(13.0)	
Never	5(3.3)	2(5.1)	3(5.7)		7(5.1)	1(2.6)	3(13.0)	
<u>Sleep when hungry</u>								
Cannot sleep at	11(7.3)	3(7.7)	0(0.0)		5(3.7)	0(0.0)	0(0.0)	
Cannot sleep we	34(22.5)	6(15.4)	7(13.2)		16(11.9)	0(0.0)	1(4.3)	
Doesn't matter	42(27.8)	12(30.8)	14(26.4)	n.s.	50(37.0)	16(41.0)	7(30.4)	p=0.002**
Can sleep ok	62(41.1)	17(43.6)	29(54.7)		64(47.4)	23(59.0)	13(56.5)	
Sleep much bette	2(1.3)	1(2.6)	3(5.7)		0(0.0)	0(0.0)	2(8.7)	
<u>Preference for salty taste</u>								
Like a lot	12(8.1)	4(10.3)	2(3.8)		4(2.9)	0(0.0)	1(4.5)	
Like a little	37(24.8)	15(38.5)	17(32.1)		34(25.0)	11(28.2)	6(27.3)	
Average	91(61.1)	19(48.7)	31(58.5)	n.s.	92(67.6)	27(69.2)	13(59.1)	n.s.
Dislike a little	9(6.0)	1(2.6)	2(3.8)		5(3.7)	1(2.6)	2(9.1)	
Dislike a lot	0(0.0)	0(0.0)	1(1.9)		1(0.7)	0(0.0)	0(0.0)	
<u>Chewing before swallowing</u>								
Chew thouroughly	54(35.5)	12(30.8)	15(28.3)		36(26.5)	10(25.6)	11(47.8)	
Average	48(31.6)	18(46.2)	23(43.4)	n.s.	49(36.0)	15(38.5)	6(26.1)	n.s.
Chew little	32(21.1)	6(15.4)	7(13.2)		21(15.4)	6(15.4)	4(17.4)	
Depend on foods	18(11.8)	3(7.7)	8(15.1)		30(22.1)	8(20.5)	2(8.7)	

1) Number of subjects(%), 2) Not significantly different within obesity subgroup at $p < 0.05$

preference for some fattening foods including instant foods, beverages, animal protein sources, and desserts/snacks. Preferences for fried chicken, ddugbboki, jajangmyun, pizza, ramyen, juice, milk, soft drink, meat, fish, cake, chocolate, ice cream and sweet bread were not significantly different between subgroups in both gender. The preferences of obese girls for these foods were not higher

than those of normal-weight girls, suggesting that a preference for certain foods may not be the characteristic of obese girls in this study. Moreover, overweight girls answered that they had significantly lower preferences for some empty-calorie foods such as candies/caramels and cookies as well as high-fat food such as samgyupsal than normal-weight girls did.

Table 5. Food preference scores¹⁾

	Boys			Girls		
	Normal	Overweight	Obese	Normal	Overweight	Obese
Instant foods						
Fried chicken	4.61±0.68(147)	4.42±1.00(38)	4.35±0.93(52)	4.27±0.94(132)	3.85±1.11(39)	4.09±0.85(23)
Ddugbboki	4.15±0.98(151)	4.38±0.81(39)	4.10±0.96(51)	4.24±0.81(136)	3.97±0.90(39)	4.09±1.24(23)
Hamburger	4.12±1.07(151)	4.00±1.00(39)	4.02±1.25(53)	3.96±1.08(133)	3.77±0.84(39)	3.54±1.22(22)
Ramyen	4.09±1.05(152)	4.10±0.91(39)	3.98±1.05(53)	3.60±1.00(135)	3.46±0.82(39)	3.95±0.94(20)
Pizza	4.08±1.19(149)	3.90±1.33(39)	4.06±1.27(50)	3.81±1.17(135)	3.43±1.17(37)	3.30±1.26(23)
Jajangmyun	4.01±1.09(150)	4.10±1.07(39)	3.88±1.13(51)	3.59±1.00(133)	3.39±0.95(38)	3.61±0.99(23)
Hot dog	3.99±1.08(147)	3.85±1.16(39)	4.01±1.03(51)	3.64±1.04(133)	3.31±0.98(39)	2.95±1.09(22)
Beverage						
Juice	4.15±0.93(151)	4.18±0.82(39)	4.04±1.07(53)	3.96±0.86(136)	3.71±0.98(38)	4.26±0.96(23)
Milk	3.93±0.96(152)	3.87±1.26(39)	3.94±1.23(53)	3.61±1.07(135)	3.79±1.09(38)	3.83±0.98(23)
Soft drink	3.95±1.09(150)	4.05±1.02(39)	4.10±0.87(52)	3.44±0.96(134)	3.26±1.20(38)	3.36±0.79(22)
Animal protein						
Meat	4.34±0.89(148)	4.28±0.76(39)	4.02±1.01(51)	3.83±0.93(131)	3.54±0.91(39)	3.61±0.89(23)
Samgyupsal	4.21±1.08(148)	4.05±1.06(38)	4.27±0.94(51)	3.71±1.06(132) ^{a2)}	3.18±1.05(39) ^b	3.70±0.86(23) ^a
Fish	3.67±1.28(146)	4.03±1.09(39)	3.80±1.20(51)	3.46±1.15(134)	3.74±0.98(38)	3.74±1.17(23)
Desserts/snacks						
Ice cream	4.18±0.92(151)	3.90±0.75(39)	4.04±0.83(53)	4.02±0.82(136)	3.82±0.82(39)	3.83±0.83(23)
Cookie	3.91±1.02(148)	3.77±0.80(39)	3.80±1.11(50)	3.77±0.85(135) ^a	3.26±0.79(39) ^b	3.65±0.88(23) ^a
Sweet bread	3.85±1.05(151)	3.72±1.02(35)	3.79±1.09(52)	3.73±0.97(136)	3.62±0.94(39)	3.45±1.01(22)
Cake	3.72±1.27(152)	3.54±1.37(39)	3.67±1.20(52)	3.59±1.18(134)	3.41±1.04(39)	3.43±1.16(23)
Chocolate	3.49±1.22(151)	3.26±1.37(39)	3.35±1.37(52)	3.59±1.05(135)	3.10±1.02(39)	3.28±1.07(18)
Candies/caramel	3.61±1.25(146)	2.95±1.31(38)	3.10±1.38(52)	3.39±1.06(134) ^a	2.79±0.77(39) ^b	3.00±1.10(21) ^{ab}

1) Mean±S.D.(number of subjects) 5=like a lot, 4=like, 3=average, 2=dislike, 1=dislike a lot

2) Values with different superscripts are significantly different within obesity subgroup at $p<0.05$

Overweight girls might have fear of obesity, which is supported by the observation of the girls' strong desire to lose weight as published previously on the study in this group(Lee 1998). In fact, there has been a study reported by Perl et al.(1998)in which the normal-weight adolescent group showed a greater liking of sweets than obese group, providing no proof for the theory of increased preference for fattening foods by obese compared to normal-weight people.

Also, Moses et al.(1989)observed that high school students reported as exaggerated concern with obesity regardless of their body weight. In the female subjects of this study, 50% of the girls wanted unnecessary weight loss and 81% of underweight girls wanted to lose or maintain their weight, which might contribute to the high prevalence rate of underweight and low prevalence rate of obesity(Lee 1998). The psychological and social factors(e.g. perception of ideal body shape of social stigmatism of obesity)can be considered as the most logical explanations for the observed differences. In order to clarify whether food preference plays a significant role in the etiology of

childhood obesity, assessment of actual intake of these foods should be included in further studies. Also, it can not be ruled out the possibility that preferences for non-fattening foods which were not determined in this study may be different between obesity subgroups.

In this study, boys did not show any significant difference in lifestyle, eating habits or food preference, suggesting that development of early-onset obesity of boys in this study rely on other factors such as genetics and food intake which were not considered in this study. Also, these results might indicate that boys were less concerned with the important health risks related to obesity. The tendency of boys to ignore the health risks associated with obesity has been reported by other studies(Moses et al. 1989).

Considering the fact that more than half of the boys perceived their own size falsely thinner and 53% of overweight and 19% of obese boys wanted to maintain their weight as reported on the study in this group(Lee 1998), these boys may need to be educated to have better standards for the diagnosis of obesity. Much efforts may need to be made to include boys' parents in this nutritional

education, since it has been reported that parents tended to be more generous with boys' but not girls' being heavier than normal(You et al. 1997).

Summary and Conclusion

This study was undertaken with 542 fifth-grade elementary school children to investigate the characteristics in lifestyle, eating habits, food preferences of overweight and obese children in the Pocheon area of Korea. Anthropometry was conducted to determine obesity and data was obtained on lifestyle, eating habits and food preferences by using questionnaires.

1) The prevalence rate of obesity was 19.5% for boys and 8.5% for girls, and 14.3% of boys and 14.4% of girls were overweight. No significant difference between subgroups was found in body size and education years of parents, socioeconomic status of family and employmental status of the mother.

2) Boys did not show any significant differences between subgroups in the lifestyle, eating habits and food preferences, suggesting that the important obesity-promoting factors of early-onset obesity of boys in this study may be the other factors such as genetics and food intake.

3) Obese girls watched TV longer and liked physical education less than normal and overweight groups did, suggesting that inactivity might be the characteristic in the lifestyle of obese girls in this area.

4) Overweight girls answered that they had significantly lower preferences for empty-calorie foods such as candies/caramels and cookies as well as high-fat food such as samgyupsal than normal-weight girls did, suggesting that they may be very conscious about their food choice.

Eating habits associated to the childhood obesity reported in other areas such as irregular meals, rapid eating, more frequent skipping of breakfast and the increased preference for salty taste were not found in the subjects of this study. Instead, this study revealed the different problems in girls according to obesity status, namely overweight girls' fear of obesity and obese girls' inactive lifestyle. And we also reconfirmed the observation published previously(Lee 1998)that boys may need to have better perception for their own body. Therefore, the importance of different focuses to each subgroup according to gender and obesity status should be emphasized in the development of intervention program to combat the problems of boys and girls.

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