

A Comparison of Food Frequency, Food Attitude, and Eating Habits between Korean-American and Korean Children

Eun-Kyung Kim,^{1)†} Young-Ja Sim,²⁾ Kye-Wol Park,¹⁾ Hee-Sun Kim¹⁾

Department of Food Science,¹⁾ Kangnung National University, Gangneung, Korea

Department of Nutrition and Food Studies,²⁾ New York University, New York, USA

ABSTRACT

Food frequency, food attitude, eating habits and physical activities of Korean-American children and Korean children were compared. Two hundred and sixty two Korean-American children living in New Jersey and New York in the United States of America (KcUS group) and three hundred and thirty one Korean children living in Seoul, Korea (KcK group) between the ages of 9 and 12 were included. There were significant differences in food frequency between these groups. The KcUS group ate more western food, more food at meal time and more snack than the KcK group. In addition, KcUS group slept longer hours and exercised less than KcK group. In this study, we learned that higher rate of obesity in Korean-American children could be partially explained by the difference in food intake, food attitude, eating habit, and physical activities between the two groups. It is suggested that a different approach will be useful in developing nutrition education programs against childhood obesity for the Korean-American children and Korean children. (*J Community Nutrition* 8(4): 177~184, 2006)

KEY WORDS: food frequency · eating habits · korean-american children.

Introduction

Childhood obesity is prevalent and rapidly increasing in Korea (Cho et al. 1989; Lee 1996; Moon et al. 1992). Most childhood obesity is caused by energy imbalance i.e. excessive energy intake and lack of energy expenditure. Changes in food attitudes and eating habits can explain the excessive energy intake, and the lifestyle that minimizes physical activities which can reduce energy expenditure. Environmental changes can affect the overall lifestyle including food choices, food attitudes, eating habits and physical activities. Radical environmental change can occur during immigration to a foreign country. Studies on eating habit changes through immigration have been reported in Mexican-American, Japanese-Brazilian, and Japanese-American (Huang et al. 1996; Franco 1996; Pri- ce et al. 1993; Stephen 1991; Sherman et al. 1995; Stern et al. 1991) and also in Korean-American (Kim et al. 1997;

Park 1997). Gupta (1976) reported that ability to change ea- ting habit related inversely to age and children were better at assimilating new culture than adults.

In the previous study (Sim et al. 2006), we reported that Korean-American children showed a higher obesity rate than Korean children. The obesity rate which was determined by percent ideal body weight was higher in both male and female Korean-American children (12.6% and 8.2%, respectively) than Korean children (8.0% and 5.1%, respectively). The edu- cations and occupations of the parents were not significantly different. It was suggested that environmental changes which occurred during the immigration to the U.S. accounted for the increase in child obesity. In this study, further investiga- tion on their food frequency, food attitude, eating habits and physical activities between Korean-American children and Korean children were observed to identify the changes in environmental factors during acculturation and their attribu- tion to obesity development.

Subjects and Methods

Five hundred and ninety three Korean children, between the ages of 9 and 12 (3rd to 6th grade at school) were in-

[†] Corresponding author: Eun-Kyung Kim, Department of Food Science, Kangnung National University, Jibyeon-dong, Gangneung 210-702, Korea

Tel: (033) 640-2336, Fax: (033) 647-9535

E-mail: ekkim@kangnung.ac.kr

cluded in this study (Table 1). Two hundred and sixty two of the children were living in New Jersey, and New York, USA (KcUS group) one hundred and twenty eight of them were male and one hundred and thirty four of them were female. They were recruited from four different Korean schools in the area. A total of three hundred and five questionnaires were distributed, forty-three of them were returned incomplete and two hundred and sixty two were used in this study.

The other three hundred and thirty one children were living in Gangnam, Seoul, South Korea. One hundred and fifty one of them were male and one hundred and eighty of them were female. Originally, four hundred questionnaires were distributed and three hundred and seventy one of them were returned, and forty of the returned questionnaires were incomplete. Only three hundred and thirty one complete questionnaires were included in this study.

A Food frequency questionnaire and a lifestyle question-

naire were handed out to children at school. The children were instructed to ask their parent to fill-out the food frequency questionnaire and to fill-out the lifestyle questionnaire themselves. The lifestyle questionnaire included questions related to food attitude, eating habits, and physical activities. Identical survey questionnaires were provided to both the Korean-American children group and Korean children group. For those Korean-American children who were not familiar with Korean language, English questionnaires were available.

The food frequency questionnaire developed by Kim et al. (1997) was revised to survey the children's intake of 26 food items. Food frequency questionnaire results were quantified using 8 point scale (almost no intake = 1, once a month = 2, 2-3 times a month = 3, once a week = 4, twice a week = 5, 3-4 times a week = 6, once a day = 7, and twice a day = 8). Higher food frequency score means that children eat the food item more frequently.

Table 1. Food frequency score of male children

	Food	Korean (n = 151)	Korean-American	
			Duration ≤ 3years (n = 45)	Duration > 3years (n = 83)
WF	Bread	4.52 ± 1.66 ^b	4.89 ± 1.96 ^{ob}	5.54 ± 1.64 ^o
	Soda	3.58 ± 2.19	4.31 ± 1.88	4.22 ± 2.37
	Cheese	2.45 ± 2.33 ^b	3.04 ± 2.37 ^{ob}	3.51 ± 1.98 ^o
	Butter/margarine	2.22 ± 2.34	2.93 ± 2.53	2.92 ± 2.26
	Hamburger	1.56 ± 1.20 ^b	2.22 ± 0.10 ^o	2.59 ± 1.33 ^o
	Pizza	1.41 ± 1.03 ^c	2.38 ± 1.01 ^b	2.90 ± 1.27 ^o
	Spaghetti, pasta	0.78 ± 0.98 ^c	1.33 ± 1.13 ^b	2.13 ± 1.29 ^o
KF	Bacon	0.72 ± 1.20 ^b	1.00 ± 1.11 ^{ob}	1.14 ± 1.19 ^o
	Kimchi	6.34 ± 2.40 ^a	5.02 ± 2.99 ^b	4.92 ± 2.42 ^b
	Broiled fish, fish with turnip	3.62 ± 1.71 ^o	3.31 ± 1.47 ^{ob}	2.99 ± 1.57 ^b
	Bean curd	3.67 ± 1.55	3.49 ± 1.88	3.42 ± 1.77
	Bean sprouts, spinach	3.30 ± 1.82 ^a	2.40 ± 1.75 ^b	2.66 ± 1.96 ^b
	Bulkogi, kalbi	2.95 ± 1.30 ^{ob}	3.22 ± 1.59 ^o	2.54 ± 1.07 ^b
	Fried rice	2.12 ± 1.23 ^o	2.11 ± 1.23 ^o	1.64 ± 1.17 ^b
Rice with bean or curry sauce	1.60 ± 1.16	1.24 ± 0.86	1.31 ± 0.95	
CF	Milk	7.24 ± 1.27 ^a	5.67 ± 2.58 ^b	5.98 ± 2.12
	Fruit juice	5.05 ± 2.09 ^b	5.82 ± 2.10 ^o	5.67 ± 1.90 ^{ob}
	Apple, Orange	4.98 ± 2.02 ^{ob}	5.47 ± 1.83 ^o	4.52 ± 2.20 ^b
	Donut cake sweets	4.77 ± 2.05	4.84 ± 2.12	4.16 ± 1.78
	Egg	4.74 ± 1.55 ^o	4.87 ± 2.06 ^o	4.05 ± 1.51 ^b
	Ice-cream	4.72 ± 2.04 ^b	3.73 ± 1.94 ^o	3.71 ± 1.54 ^o
	Yogurt	4.46 ± 2.51 ^b	2.07 ± 2.13 ^o	2.45 ± 2.11 ^o
	Chocolate, candy	2.87 ± 2.22	2.53 ± 2.46	2.90 ± 1.83
	Ham, sausage	1.98 ± 1.54	2.33 ± 1.81	2.42 ± 1.62
	Fried chicken	1.95 ± 1.22	1.69 ± 1.26	1.78 ± 1.19
	Mayonnaise, salad dressing	1.86 ± 1.95	2.09 ± 1.93	2.22 ± 1.84

WF: western food, KF: korean Food, CF: common Food

Values are mean ± SD

Values in the same row with different superscript were significantly different ($p < 0.05$)

Twenty six food items were divided into 8 western foods (breads, soda, cheese, butter and margarine, pizza, hamburger, spaghetti and other type of pasta, and bacon) and 7 Korean foods (kimchi, grilled and boiled fish, tofu, bean sprouts and spinach, grilled beef and ribs, fried rice, and rice with bean sauce or curry sauce) and 11 common foods (milk, ice cream, donuts, cakes and other snack, apple and orange, egg, fruit juice, yogurt, chocolate and candy, ham and sausage, mayonnaise and salad dressing, and fried chicken).

The lifestyle questionnaire consisted of 7 questions on food attitude, 7 questions on eating habits, and 6 questions on physical activities. The 7 food attitude questions from Boren (Boren et al. 1983) and Kang et al. (1992) were used in this study. The Likert-type 5 point scale was used to quantify the food attitude related to obesity occurrences (not at all: 1, rarely: 2, some times: 3, often: 4, always: 5). The survey questionnaires on eating habits included the regularity of meals, number of snacks, reasons for snacking, the heaviest meal of the day, eating speed, and the size of the meal. To assess the daily physical activities, sleeping hours, means of transportation to school, hobbies, frequency of exercise, and hours of watching TV/VCR were asked.

Statistical analysis was performed using SAS software (Statistical Analysis system) (1987). KcUS was further divided into 2 groups according to the residential duration in the USA less than 3 years (KcUS3-) and more than 3 years (KcUS3+) to show the changes occurred during the acculturation. Analysis of covariance (ANOVA) was used to compare the food frequency and food attitude results among three groups and Tukey's method was done as a post-hoc test. Difference of eating habits and physical activities between KcK group and KcUS3+ group was compared by χ^2 -test.

Results

1. Food frequency questionnaire score

The food frequency score between male KcK group and KcUS groups were compared (Table 1). KcUS group showed significantly higher food frequency score on western food than KcK group, especially hamburgers, pizza, and spaghetti and other types of pasta. On the other hand, the KcK group showed significantly higher score on Korean foods, especially kimchi, broiled fish/fish with turnip, soybean sprouts, spinach, and fried rice than the KcUS group. There was a significant decline of kimchi intake along with the du-

ration of the residence in the U.S.; KcK group 6.34 ± 2.40 , KcUS3- group 5.02 ± 2.99 , and KcUS3+ group 4.92 ± 2.42 . Between the two KcUS groups, KcUS3+ group showed a significantly lower food frequency score on Korean food, such as Bulkogi/Kalbi and fried rice, and a significantly higher food frequency score on western food, such as pizza, and spaghetti and other type of pasta. The food frequency score on common food, KcK group scored significantly higher on milk, KcUS group scored significantly higher on ice-cream, yogurt, and fruit juice.

The food frequency score between female KcK group and female KcUS groups were also compared (Table 2). Female KcUS groups showed a significantly higher score than KcK group on western food except bacon. Female KcK group showed significantly higher score than the female KcUS groups on Korean food, such as kimchi, and broiled fish/fish with turnip. The food intake frequency score on common food, KcK group showed significantly higher score on milk, fruit juices, apples · oranges, and yogurt, KcUS group showed significantly higher score on donuts, cakes, sweets, ice-cream, chocolates, candies, hams, sausages, fried chicken, and mayonnaise and salad dressings.

The results appeared similar between male and female children, except female children showed lower score than male children on high fat food, such as butter and margarine, presumably because female children were more weight conscious than male children.

2. Food attitude related to obesity

Food attitude related to developing obesity were analyzed using the Likert-type scale, the higher the score, the higher risk of developing obesity (Table 3).

For male children, KcK group scored significantly lower than KcUS groups on 'I enjoy eating instant food', 2.99 ± 1.09 , 3.84 ± 0.80 and 3.71 ± 0.96 for KcK, KcUS3-, and KcUS3+, respectively. KcUS groups scored significantly higher than KcK group on 'I like greasy food', 'I enjoy eating sweet food for snack', 'I eat until I am full' and 'I eat when I do not feel like eating'.

Food attitude score related to obesity was higher in male children than in female children. Female KcUS group showed significantly higher score on every questionnaire except 'I love to eat chocolate and candies', on which female KcK group showed slightly higher score ($p < 0.05$).

Between KcUS groups, male KcUS3+ group showed signi-

ificantly higher score on 'I enjoy eating sweet food for snack' than male KcUS3 – group and female KcUS3 + group showed significantly higher score on 'I love to eat chocolate and

candies' and 'I eat until I am full' than female KcUS3 – gro-up.

In many questions, KcUS3 – group did not show significant

Table 2. Food frequency score of female children

	Food	Korean (n = 180)	Korean-American	
			Duration ≤ 3years (n = 64)	Duration > 3years (n = 70)
WF	Bread	4.32 ± 1.64 ^c	5.06 ± 1.60 ^p	5.70 ± 1.73 ^a
	Soda	2.97 ± 2.30 ^b	3.89 ± 1.94 ^a	3.54 ± 2.28 ^{ab}
	Cheese	1.92 ± 2.11 ^b	2.86 ± 2.28 ^a	2.87 ± 2.10 ^a
	Butter/margarine	1.82 ± 2.10 ^b	2.58 ± 2.10 ^a	2.56 ± 2.18 ^a
	Hamburger	1.33 ± 1.03 ^b	2.56 ± 1.21 ^a	2.70 ± 1.24 ^a
	Pizza	1.33 ± 1.17 ^b	2.50 ± 1.28 ^a	2.16 ± 1.44 ^a
	Spaghetti, pasta	0.86 ± 1.07 ^b	1.80 ± 1.22 ^a	2.16 ± 1.14 ^a
	Bacon	0.65 ± 1.16	0.84 ± 1.22	0.89 ± 1.16
KF	Kimchi	6.79 ± 2.07 ^a	6.30 ± 2.05 ^{ab}	5.60 ± 2.24 ^b
	Broiled fish, fish with turnip	3.86 ± 1.65 ^a	3.30 ± 1.49 ^b	2.84 ± 1.52 ^b
	Bean curd	3.47 ± 1.76	3.78 ± 1.47	3.73 ± 2.02
	Bean sprouts, spinach	3.26 ± 1.84	3.61 ± 1.56	3.14 ± 2.02
	Bulkogi, kalbi	3.03 ± 1.47	2.92 ± 1.04	2.61 ± 1.22
	Fried rice	1.97 ± 2.31	2.17 ± 1.43	1.86 ± 1.51
	Rice with bean or curry sauce	1.46 ± 1.06 ^{ab}	1.67 ± 1.04 ^a	1.23 ± 0.10 ^b
CF	Milk	6.58 ± 1.94 ^a	5.48 ± 2.26 ^b	2.41 ± 2.14 ^b
	Fruit juice	4.87 ± 2.00 ^a	4.05 ± 1.78 ^b	3.86 ± 1.90 ^b
	Apple, Orange	4.84 ± 2.02 ^a	4.66 ± 2.06 ^{ab}	4.00 ± 2.18 ^b
	Donut cake sweets	4.69 ± 2.29 ^c	6.16 ± 1.53 ^a	5.36 ± 1.95 ^b
	Egg	4.62 ± 1.67	4.20 ± 1.84	4.17 ± 1.87
	Ice-cream	4.40 ± 2.38 ^c	6.45 ± 1.38 ^a	5.74 ± 2.27 ^b
	Yogurt	3.90 ± 2.55 ^a	2.45 ± 2.26 ^b	2.41 ± 2.14 ^b
	Chocolate, candy	2.61 ± 2.35 ^b	3.20 ± 2.12 ^{ab}	3.70 ± 2.07 ^a
	Ham, sausage	1.88 ± 1.70 ^b	2.50 ± 1.49 ^a	2.20 ± 1.66 ^{ab}
	Fried chicken	1.82 ± 1.87 ^b	2.61 ± 2.02 ^a	2.36 ± 2.15 ^{ab}
Mayonnaise, salad dressing	1.66 ± 1.18 ^b	1.88 ± 1.12 ^a	1.97 ± 1.17 ^a	

WF: western food, KF: Korean Food, CF: common Food

Values are mean ± SD

Values in the same row with different superscript were significantly different (p < 0.05)

Table 3. Comparison of the food attitude related to obesity among children

	Male			Female		
	Korean (n = 151)	Korean-American		Korean (n = 180)	Korean-American	
		Duration ≤ 3yrs (n = 45)	Duration > 3yrs (n = 83)		Duration ≤ 3yrs (n = 64)	Duration > 3yrs (n = 70)
I enjoy eating sweet food for snack	2.18 ± 0.84 ^b	2.69 ± 1.00 ^b	3.08 ± 1.00 ^a	2.37 ± 1.00 ^b	2.65 ± 0.90 ^{ab}	2.70 ± 1.03 ^a
I enjoy eating instant food	2.99 ± 1.09 ^b	3.84 ± 0.80 ^a	3.71 ± 0.96 ^a	2.85 ± 1.04 ^b	3.30 ± 1.03 ^a	3.28 ± 0.98 ^a
I love to eat chocolate and candies	2.29 ± 1.12	2.02 ± 0.95	2.27 ± 1.21	2.38 ± 1.11 ^a	1.89 ± 1.11 ^b	2.35 ± 1.23 ^a
I eat until I am full	2.80 ± 1.06 ^b	3.05 ± 1.16 ^{ab}	3.42 ± 0.96 ^a	2.59 ± 1.01 ^c	2.94 ± 1.14 ^b	3.38 ± 1.00 ^a
I eat when I do not feel like eating	2.18 ± 1.03 ^b	2.82 ± 0.96 ^a	2.59 ± 1.08 ^a	2.12 ± 1.06 ^b	2.39 ± 1.03 ^{ab}	2.73 ± 0.98 ^a
I like greasy food	3.23 ± 1.00 ^b	3.47 ± 1.10 ^{ab}	3.78 ± 0.83 ^a	2.97 ± 1.16 ^b	3.27 ± 1.06 ^{ab}	3.40 ± 0.92 ^a
I feel better after I eat	1.99 ± 1.13	2.00 ± 0.71	2.11 ± 1.04	1.78 ± 1.04 ^b	1.91 ± 0.97 ^{ab}	2.13 ± 0.93 ^a
Total	2.57 ± 0.53 ^b	2.83 ± 0.47 ^a	2.99 ± 0.56 ^a	2.43 ± 0.52 ^b	2.62 ± 0.59 ^b	2.84 ± 0.55 ^a

Values are mean ± SD

Values in the same row with different superscript were significantly different (p < 0.05)

difference from KcK group but KcUS3+ group scored higher in food attitude questionnaire than KcK group. Overall, food attitude score related to developing obesity was highest in KcUS3+ group and lowest in KcK group.

3. Eating habits and lifestyle

Since KcK group and KcUS3+ group showed significant difference in food frequency score and food attitude score, comparison on eating habit and lifestyle will be focused on these two groups (Table 4).

Both male and female children showed a higher tendency to eat dinner as the heaviest meal. Male KcK group and KcUS3+ did not show much difference. But female children checked their heaviest meal significantly different. Only 2.9% of female KcUS3+ group checked 'breakfast' as their heaviest meal, whereas 14.0% of female KcK group did.

Most of the male and female children answered 'properly' on quantity of meal. However, 27.7% of male KcUS3+ group answered that they 'always eat too much' and only 8.0% of male KcK group answered that they tend to overeat. And

14.3% of female KcUS3+ group answered they 'always eat too much', whereas 3.4% of female KcK group did.

Reasons for snacking did not show a significant difference between female children in Korea and the U.S. However, 53.1% of male KcK group said that they had snacks 'because of hunger' and 15.2% of them had snacks because it was 'mom's suggestion', whereas 54.9% of male KcUS3+ group said that they had snack 'because of hunger' and 23.2% of them said that they had 'From habit'.

The lifestyle of Korean-American children and Korean children were compared (Table 5). Both male and female Korean-American children answered longer sleeping hours than Korean children. 79.5% of male KcUS3+ group and 77.0% of female KcUS3+ group checked '8-9 hours' of sleeping whereas 63.8% and 62.2% of KcK male and female children did. Only 10.8% and 17.7% of male and female KcUS children were sleeping '6-7 hours' and 33.6% and 35.0% of male and female KcK groups were.

89.9% and 88.3% of male and female Korean children walked to school and only 24.1% and 20.3% of male and female

Table 4. Comparison of the eating habits among children

		Male		Female	
		Korean	Korean-American*	Korean	Korean-American*
Most heavy meal	Breakfast	11(7.3)	4(4.8)	25(14.0)	2(2.9)
	Lunch	28(18.7)	12(14.5)	32(17.9)	13(18.6)
	Dinner	111(74.0)	67(80.7)	122(68.2)	55(78.6)
	Total	150(100.0)	83(100.0)	179(100.0)	70(100.0)
		$\chi^2 = 1.392, df = 2, p = 0.499$		$\chi^2 = 6.509, df = 2, p = 0.039$	
Quantity of meal	Not willing to eat	24(15.9)	9(10.8)	27(15.1)	7(10.0)
	Properly	115(76.2)	51(61.5)	146(81.6)	53(75.7)
	Always too much	12(8.0)	23(27.7)	6(3.4)	10(14.3)
	Total	151(100.0)	83(100.0)	179(100.0)	70(100.0)
		$\chi^2 = 16.595, df = 2, p = 0.001$		$\chi^2 = 10.530, df = 2, p = 0.005$	
Speed of eating	Slow	111(74.0)	67(80.7)	122(68.2)	55(78.6)
	Normal	28(18.7)	12(14.5)	32(17.9)	13(18.6)
	Fast	11(7.3)	4(4.8)	25(14.0)	2(2.9)
	Total	150(100.0)	83(100.0)	179(100.0)	70(100.0)
		$\chi^2 = 0.499, df = 2, p = 0.499$		$\chi^2 = 6.509, df = 2, p = 0.039$	
Reason for snack	By hunger	77(53.1)	45(54.9)	87(49.4)	42(61.8)
	From habit	20(13.8)	19(23.2)	33(18.8)	13(19.1)
	By force by mother	22(15.2)	12(14.6)	20(11.4)	5(7.4)
	To kill time	16(11.0)	4(4.9)	27(15.3)	6(8.8)
	To keep friends	1(0.7)	2(2.4)	3(1.7)	1(1.5)
	To relieve stress or loneliness	9(6.2)	0(0.0)	6(3.4)	1(1.5)
	Total	145(100.0)	82(100.0)	176(100.0)	68(100.0)
		$\chi^2 = 11.278, df = 5, p = 0.046$		$\chi^2 = 4.384, df = 5, p = 0.496$	

*Duration of residence in the US > 3 years
Values are number of subjects (%)

Table 5. Comparison of the lifestyle among children

		Male		Female	
		Korean	Korean-American*	Korean	Korean-American*
Sleeping hours	6-7 hours	50(33.6)	9(10.8)	63(35.0)	12(17.7)
	8-9 hours	95(63.8)	66(79.5)	112(62.2)	53(77.9)
	10 hours over	4(2.7)	8(9.7)	5(2.8)	3(4.4)
	Total	149(100.0)	83(100.0)	180(100.0)	68(100.0)
		$\chi^2 = 17.706, df = 2, p = 0.001$		$\chi^2 = 7.156, df = 2, p = 0.028$	
Way of going to school	On foot	132(89.8)	20(24.1)	159(88.3)	14(20.3)
	School bus	1(0.7)	10(12.1)	0(0.0)	9(13.0)
	Car	7(4.8)	53(63.9)	5(2.8)	46(66.7)
	Bus or subway	7(4.8)	0(0.0)	16(8.9)	0(0.0)
	Total	147(100.0)	83(100.0)	180(100.0)	69(100.0)
		$\chi^2 = 12.395, df = 3, p = 0.001$		$\chi^2 = 4.383, df = 5, p = 0.001$	
Favorite hobby	TV	8(5.5)	16(19.3)	44(25.7)	15(21.4)
	Video and computer game	50(34.3)	28(33.7)	3(1.8)	8(11.4)
	Reading	14(9.6)	10(12.1)	47(27.5)	26(37.1)
	Exercise	64(43.8)	25(30.1)	51(29.8)	11(15.7)
	And so on	10(6.9)	4(4.8)	26(15.2)	10(14.3)
	Total	147(100.0)	83(100.0)	171(100.0)	70(100.0)
		$\chi^2 = 12.840, df = 4, p = 0.012$		$\chi^2 = 15.961, df = 4, p = 0.003$	
Frequency of exercise	Rarely	7(4.6)	3(3.6)	23(12.9)	7(10.0)
	1-2 days/week	16(10.6)	28(33.7)	56(31.3)	19(27.1)
	3-5 days/week	49(32.5)	30(36.1)	64(35.8)	29(41.4)
	Almost everyday	79(52.3)	22(26.5)	36(20.1)	15(21.4)
	Total	151(100.0)	83(100.0)	179(100.0)	70(100.0)
		$\chi^2 = 23.865, df = 3, p = 0.001$		$\chi^2 = 1.102, df = 3, p = 0.777$	

*Duration of residence in The US > 3years
Values are number of subjects (%)

Korean-American children walked to school. Many of Korean-American children rode 'in a car' to go to school, those of which were 63.9% of male and 66.7% of female. Only 4.8% of male and 2.8% of female Korean children rode 'in a car' to school.

30.1% of male and 15.7% of female KcUS3+ group said their favorite hobby were exercise (swimming or soccer) and 43.8% of male and 29.9% of female KcK group did. 37.1% of male and 12.1% of female KcUS3+ group picked reading as their favorite hobby and 27.5% of male and 9.6% of female KcK group did.

52.3% of male Korean children exercised 'almost everyday' and only 26.5% of male Korean-American children did. The frequency of exercising between female children in Korea and the U.S was not different.

Discussion

Food preference of Korean-American children was wester-

nized compared to Korean children. Korean-American children eat western food more frequently than Korean food as they get used to the American culture and food. Among Korean-American children, the longer they live in the United States of America, the more they eat western food.

It is not easy to change food habit and when it is changed it happens gradually. But for those who moved to a country with a different food culture, rapid changes in food intake could occur (Yang, Fox 1979). It was reported that the environmental factor played the biggest role in changing food habit of Chinese people in Lincoln, Nebraska from China (Newman, Ludman 1984). Park's study (1997) on food adaptation and changes of food habits of Koreans living in the U.S. showed that the younger the children started living in the U.S., the faster they adapted to the western food. There was a dramatic decrease in Korean foods intake, such as steamed rice, rice cake, and bean sprouts for Korean-American children but there was almost no change in intake of kimchi. The food frequency showed that they ate steamed rice the most fre-

quently, followed by kimchi, vegetable, soup, meat and fish, and beans. In this study, Korean American children showed high food frequency score on western food such as bread, hamburger, pizza, and spaghetti. In contrast, Korean children showed high food frequency score on kimchi.

Other studies on immigrants (Newman, Ludman 1984; Sridaran, Kolhatkar 1994; Stern et al. 1991) have also reported that the people who moved to western countries have changed their eating habits in adapting to a new food culture. A research of genetic and environmental determinants of type II diabetes (Stern 1991) in Mexican-Americans have reported that increased intake of energy, fat, and sugar and decreased intake of carbohydrate occurred in the highly westernized group, especially fat intake having the highest.

Waxman, Stunkard's research (1980) reported that obese children received more food from their mothers and left less on their plates. Children with psychological problems and/or emotional disorders had a higher risk of developing obesity due to their tendency of overeating (Brooke, Abernethy 1985).

Research on Korean elementary school children (Lee, Oh 1997) reported that many of the obese children chose 'eat a lot' and most of the normal weight children chose 'eat properly' when they were asked about usual amount of meal intake. In this study, Korean-American children scored higher than Korean children on obesity related food attitude questions, such as 'I like greasy food', 'I enjoy eating sweet food for snack', 'I eat until I am full', and 'I eat when I do not feel like eating'.

In addition, male children scored higher in the food attitude questionnaire related to developing obesity than female children (Table 3). Park and et al. (1994) have reported that the obese people eat their meal much faster than normal weight people. Eating meal quickly takes more food to make one feel full than eating slowly (Ferguson 1988). Eating a big amount of food in a short time can change hormone level including insulin, stimulate the lipogenesis and increase obesity (Kim 1988). Interestingly, 14.0% of Korean female children answered that they eat 'fast', contrast to 2.9% of Korean-American female children did. This may be resulted from a Korean tradition that no talking allowed during meal.

In this study, Korean-American children slept longer hours and much less of them walked to school and also exercised less compared to Korean children (Table 5). All of those attributes to lower daily energy expenditure.

Conclusion

Child obesity is not just an indicator of a future disaster, but of adult obesity and related diseases. Many obese children are suffering physically, psychologically, and socially from being overweight itself and obese related chronic diseases. It is very important to recognize factors related to obesity development and to make an effort to avoid them.

Children easily assimilate new culture compared to adults and it is reported that Korean children already like instant food and fast food (Son, Lee 1997). It could be assumed that an adaptation of western food and culture for Korean-American children may have happened rather rapidly and smoothly.

However, a couple of researches on immigrants (Kim, Sim 1997; Park 1997) showed that eating familiar food of their own country is comforting and satisfactory when they were stressed from learning a new language and adapting to sudden life changes. In fact, in the case of Chinese-Americans (Yang, Fox 1979; Newman, Ludman 1984) and their 2nd generation, it is reported that their original Chinese food culture were preserved after immigration to the U.S.

In this study, we learned that Korean-American children eat more western food and have food attitudes, eating habits and lifestyles related to obesity compared to Korean children possibly due to the different environments between two countries. It seems that it will be favorable to encourage Korean children to maintain traditional food choices, eating habits and physical activities. And development of a comprehensive education program toward obesity prevention and treatment, which includes how to manage proper diet in a country with different food availability, food culture, and lifestyle, will be essential for Korean-American children.

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