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Acculturation and Dietary Intake of Korean American Women Living in California*

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The objective of this study was to examine the effect of acculturation stage on dietary intake of Korean American women (n=124) living in California and to compare the dietary intake with that of Korean women (n=191) in Seoul, Korea. The dietary intake of the subjects was collected by 24-hour recall method at cross-sectional surveys. Cluster analysis performed on immigration variables (e.g., length of residency, age at immigration, etc.) classified Korean American women into less (n=73) or more (n=51) acculturated group. Acculturation stage did not have a significant effect on macronutrient intake. However, vitamin C intake was higher in the more acculturated group, while intakes of folate, calcium, iron, and zinc were higher in the less acculturated group. In comparison of three groups (the more and the less acculturated Korean American, and the Korean group), the more acculturated the women were, the less frequently they consumed rice and kimchi ($p<0.05$). Korean American women ate bread/noodle, meat/meat products, fruit juice, and soda more often and consumed vegetables less frequently, compared with Korean women ($p<0.05$). For breakfast, Western dishes were preferred in both more and less acculturated groups. Korean dishes were favored for dinner by both groups, even though the less acculturated group ate more Korean dishes than did the more acculturated group. The acculturation measured by immigration variables influenced nutrient intakes, food consumptions, and types of dishes eaten in Korean Americans. Cultural and health implications of dietary acculturation need to be studied in the future.

Key words: Korean Americans, Acculturation, Food consumption, Nutrient intake, Type of dish

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INTRODUCTION

Korean immigration to the US has a history of about one hundred years. The first Korean immigrants arrived at Hawaii in 1903 and the big immigration wave began with the Immigration Act of 1965. Korean American populations exist throughout the US, with the largest groups residing in Los Angeles, New York, Chicago, and northern Virginia. The 2000 U.S. Census reported that the population of Korean Americans was well over one million.[1)]

Immigrants bring their traditional culture to the host country with dramatically different beliefs, values, and customs. However, immigration to a new country can represent a substantial shift in a person's lifestyle and environment, and these changes can result in rapid modifications in chronic disease risk.[2)] Although it is not easy to assess the level of dietary acculturation and there is no gold standard, it is important to understand the process and factors influencing changes in nutrient intake. Information is needed to assess changes in risk for diseases from dietary acculturation and to create successful interventions from the potential negative aspects of dietary acculturation.[2)]

Many of the recent studies on dietary changes of Korean Americans collected dietary information from the subjects either by mailed survey or by interview.[3-11)] However, only a few studies estimated food and nutrient intakes using the 24-hour recall, dietary record or food frequency questionnaire.[12-18)] Particularly, studies investigating food and nutrient intakes of Korean Americans

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according to acculturation level were very limited.[16)]

The objective of this study was to examine the effect of acculturation stage on dietary intake of Korean American women in California. Nutrient intakes and types of dishes consumed most frequently were compared among the three groups of subjects.

MATERIALS AND METHODS

1. Sampling Methods

A cross-sectional survey was conducted with a convenience sample of Korean American women living in California. The study was reviewed and approved by the San Diego State University's Committee on the Protection of Human Subjects. To make the sample more consistent in acculturation and family characteristics, study criteria required that women had to have lived in the US for more than two years and had one or more teenage (13-18 years) child. Women were recruited through the Korean Health Center in Los Angeles and from Korean churches in Southern and Northern California. Participants were also recruited through Korean newspapers and broadcasting services in these areas. The survey in Southern California, which included Los Angeles and San Diego, was conducted during the summer of 1999. In Northern California, which included San Jose, San Francisco, and the East Bay Area, the survey was conducted during the summer of 2000. The same survey was undertaken with a convenience sample of Korean women living in Seoul in order to use their dietary intakes as a reference for Korean traditional diet. Subjects were recruited from students enrolled in middle and high schools and their parents.

2. Data Collection

Participants were interviewed by one of either of two Korean dietitians or five Korean college students studying in California. All interviewers were trained in study protocol and could administer all portions of the survey in English and/or Korean. The questionnaire was administered either by individual interview or to several women simultaneously as a small group. The questionnaire included the questions about the sociodemographic characteristics, the information related to acculturation stage, and the frequency questions of selected food groups. The questionnaire was pilot tested with small groups of Korean Americans for applicability and clarity of the question, prior to its use as a survey instrument for the larger study. Food and nutrient intakes of women were determined by individual interview, using the 24-hour recall method. One hundred-twenty four Korean American and 191 Korean women provided complete data on immigration and dietary intake.

3. Data Analysis

The seven questions (e.g., length of residency, age at arrival, trial to adapt to American society, etc.) used to assess acculturation were tested for internal validity (Cronbach $\alpha \geq 0.7$) and were used to divide subjects by acculturation stage (Table 1). Using cluster analysis in SAS, subjects were classified into two groups. All seven variables were tested to determine if there was a significant difference between the less and more acculturated women by t-test. Two variables, perceived comparison of life in the US with life in Korea, and perceived trial to adapt to American society, did not differ between two groups. Cluster analysis was repeated excluding these two variables and the subjects were categorized into two groups as shown in Table 1.

Table 1. Acculturation variables used in the cluster analysis of Korean American women's characteristics

Variable	Acculturation stage		P value[2)]
	Less acculturated (n=73)	More acculturated (n=51)	
Length of stay in the US (years)	11.7 ± 5.9[1)]	20.6 ± 3.6	p<0.001
Age of arrival in the US (years)	33.0 ± 5.2	22.6 ± 3.5	p<0.001
Perceived ease of communication in English (4-point scale)[3)]	2.41 ± 0.60	3.00 ± 0.66	p<0.001
Perceived satisfaction with life in the US (5-point scale)[4)]	3.54 ± 0.97	4.10 ± 0.78	p=0.001
Perceived adaptation to the life in the US (5-point scale)[4)]	3.37 ± 0.81	4.08 ± 0.72	p<0.001
Perceived comparison of life in the US with life in Korea (3-point scale)[5)]	2.47 ± 0.76	2.67 ± 0.56	p=0.120
Perceived trial to adapt to American society (5-point scale)[4)]	3.36 ± 0.91	3.51 ± 0.88	p=0.367

[1)] Mean ± SD
[2)] P values for t-test
[3)] 1 - unable to communicate, 2 - can communicate only on a basic level, 3 - every day conversation is possible but can't communicate intimately, 4 - fully capable of communicating in English at any level
[4)] Likert-type scaling; 1 - not at all, 3 - neutral, 5 - very well
[5)] 1 - life in Korea is better, 2 - no big difference, 3 - life in the US is better

Nutrient intakes of Korean American women were calculated with Nutritionist Five (Version 2.3, First DataBank Inc. CA). Nutrient composition of Korean foods not contained in the database of Nutritionist Five was added manually from Nutrient Database of Foods developed by Korean Nutrition Society.[19] This database was also used in software, DS 24, developed at Seoul National University and was used in computing nutrient intakes of Korean women. American women's intakes within the age range of Korean American women were presented from the 1988-1994 National Health and Nutrition Examination Survey (NHANES III) as a reference.[20]

All analyses were conducted using Version 8.01 of SAS. An alpha of $p<0.05$ was used to determine statistical significance. Differences in the distribution for the types of dishes among the less and more acculturated groups of Korean Americans and Korean group were examined by chi-square test. Analysis of variance with Duncan's multiple range test was used to compare food consumption frequencies and nutrient intakes among three groups. Mean values for NHANES III were presented as weighted mean, because of a sampling feature.

RESULTS

1. Acculturation Variables

Of Korean American subjects, fifty-one women (41%) were classified into more acculturated group by cluster analysis. Mean ages of the more (43.1 years) and the less (44.6 years) acculturated group showed that they were approximately three years older than the Korean women (40.9 years). The more acculturated women had lived in the US longer by about 9 years, arrived in the US at a younger age, communicated in English better, were more satisfied with, and better adapted to life in the US than the less acculturated women (Table 1).

2. Food and Nutrient Intakes

The more acculturated women were, the less frequently they consumed rice and kimchi ($p<0.05$, Table 2). Korean American women consumed bread/noodle, meat/meat products, fruit juice, and soda more frequently and vegetables less frequently than did Korean women ($p<0.05$).

The nutrient intakes of Korean, Korean-American, and American women are shown in Table 3 with Dietary Reference Intakes for Americans[21-25] and Koreans[26] for each nutrient. When the intakes of Korean American women were compared to women of similar age in NHANES III, intakes of energy and fat, percent energy from fat, and calcium were lower, but sodium and vitamin B_6 intakes were higher in Korean Americans than in the sample of American women used for NHANES III. Although energy intake was higher in Koreans than in Korean Americans ($p<0.05$), there were no differences in protein and fat intakes between the groups. Vitamin C intake was increased directly with the degree of acculturation of Korean American women ($p<0.05$). Vitamin C intake of Americans was very similar to that of Koreans. Calcium intake in the more acculturated group was lower than those of the less acculturated and of the Koreans ($p<0.05$). Iron and zinc intakes of the less acculturated group were the highest among three groups ($p<0.05$). Korean American women had lower percent energy from carbohydrate but higher from protein than did Korean women ($p<0.05$). Percent of energy from fat was higher in Korean Americans than in Korean. However, it was still lower than the upper limit of Dietary Guidelines for Americans, whereas Americans' energy intake from fat was very close to the upper limit (35%) of the guidelines (Table 3).[27]

Table 2. Frequency of intake per week for the selected food groups

Food group	Koreans (n=191)	Korean Americans	
		Less acculturated (n=73)	More acculturated (n=51)
Rice	13.7 ± 1.5[a,1)]	10.2 ± 4.0[b]	8.8 ± 3.7[c]
Bread/Noodle	4.4 ± 2.9[a]	8.2 ± 3.8[b]	9.1 ± 4.1[b]
Meat/Meat products	3.1 ± 1.9[a]	4.5 ± 3.2[b]	4.4 ± 3.2[b]
Fish/Shellfish	3.4 ± 2.3	3.4 ± 2.2	3.4 ± 2.1
Kimchi	13.0 ± 2.7[a]	9.7 ± 4.2[b]	7.9 ± 3.5[c]
Vegetables	15.7 ± 8.3[a]	9.5 ± 6.0[b]	8.6 ± 5.6[b]
Fruits	8.0 ± 5.4	8.9 ± 5.6	8.6 ± 4.8
Milk/Milk products	6.0 ± 4.5	7.0 ± 4.6	5.7 ± 4.7
Bean/Bean products	4.6 ± 3.7	5.3 ± 4.0	5.0 ± 3.4
Fruit juice	3.5 ± 3.3[a]	7.3 ± 4.2[b]	7.0 ± 4.5[b]
Soda	2.6 ± 3.2[a]	4.0 ± 3.5[b]	4.0 ± 3.4[b]
Coffee/Tea	8.2 ± 5.0	9.8 ± 4.9	9.6 ± 4.8

[1)] Mean ± SD
[a,b,c] Groups with different letters in the same raw are significantly different by the Duncan's multiple range test at α =0.05.

3. Consumption of Dishes

Table 4 shows the dishes frequently consumed by Korean and Korean American women. Korean Americans consumed cooked rice and kimchi, the basic foods in Korean traditional meals, less frequently than did Koreans, but they consumed cookies and sweets, and toast more often than did Koreans. Only the more acculturated group often consumed orange juice and soda. Also, they did not eat Doenjang Jjigae, the traditional

Table 3. Nutrient intakes of Korean, Korean American, and American women

Nutrient	Koreans (n=191)	Korean Americans		Americans[1] (n=2,133)	RDA/AI for American women[2]	RI for Korean women[3]
		Less acculturated (n=73)	More acculturated (n=51)			
	←– – – – – – – – – – Mean ± SD – – – – – – – – – –→			Weighted mean		
Energy (kcal)	1,732 ± 549[a]	1,554 ± 410[b]	1,556 ± 468[b]	1,811		
Protein (g)	72.4 ± 29.6	72.7 ± 26.8	72.4 ± 26.4	68.3	46	45
Fat (g)	43.8 ± 29.8	43.5 ± 19.2	46.5 ± 25.4	71.2		
Cholesterol (mg)	279 ± 195	237 ± 157	272 ± 207	234		
Carbohydrate (g)	258 ± 69[a]	219 ± 61[b]	213 ± 67[b]	221	130	
Vitamin A (μg RE)[4]	753 ± 608	756 ± 755	841 ± 707	883	700 μg RAE[5]	650/600[6]
Vitamin B_6 (mg)	2.39 ± 2.58	1.90 ± 0.84	1.75 ± 0.59	1.55	1.3/1.5[7]	1.4
Vitamin C (mg)	96.3 ± 56.4[a]	112 ± 70[ab]	118 ± 92[b]	92.5	75	100
Folate (μg)	250 ± 117[a]	227 ± 96[ab]	211 ± 93[b]	238	400 μg DFE[8]	400 μg DFE
Calcium (mg)	574 ± 307[a]	556 ± 311[a]	454 ± 220[b]	687	1000/1200[7]	700/800[6]
Phosphorous (mg)	1,081 ± 390[a]	991 ± 356[ab]	936 ± 325[b]	1,082	700	700
Iron (mg)	11.7 ± 4.6[a]	13.2 ± 9.6[b]	12.2 ± 4.0[ab]	12.9	18/8[7]	14/9[6]
Zinc (mg)	8.42 ± 3.60[ab]	9.11 ± 5.94[a]	7.65 ± 2.87[b]	9.73	8	8
Sodium (mg)	4,848 ± 1,995[a]	4,858 ± 2,001[a]	3,973 ± 1,655[b]	2,950		
% Energy						
Carbohydrate (%)	61.5 ± 10.5[a]	56.9 ± 9.4[b]	55.6 ± 10.4[b]	49.8	45-65[9]	55-70[9]
Protein (%)	16.6 ± 3.9[a]	18.6 ± 4.8[b]	18.7 ± 4.6[b]	15.5	10-35[9]	7-20[9]
Fat (%)	21.4 ± 9.0[a]	24.7 ± 7.2[b]	26.0 ± 9.2[b]	34.2	20-35[9]	15-25[9]

[1] Women within the age range (37-52) of Korean American women were selected from NHNES III.
[2] RDA, Recommended Dietary Allowance; AI, Adequate Intake for 31-70 years of age
[3] RI, Recommended Intake for 30-64 years of age
[4] RE, retinol equivalents
[5] RAE, retinol activity equivalents
[6] 30-49/50-64 years of age
[7] 31-50/51-70 years of age
[8] DFE, dietary folate equivalents
[9] Acceptable Macronutrient Distribution Range
[a,b,c] Groups with different letters in the same raw are significantly different by the Duncan's multiple range test at α=0.05.

Table 4. Frequently consumed dishes of Korean and Korean American women

Rank	Koreans (n=191)		Korean Americans			
			Less acculturated (n=73)		More acculturated (n=51)	
1	Cooked rice	55.1[1]	Cooked rice	34.2	Cooked rice	30.7
2	Kimchi (Chinese cabbage)	48.2	Coffee	32.4	Coffee	26.8
3	Coffee	21.1	Kimchi (Chinese cabbage)	26.5	Kimchi (Chinese cabbage)	15.7
4	Milk	12.2	Water melon	11.0	Water melon	10.5
5	Deonjang Jjigae[2]	10.5	Milk	11.0	Milk	9.2
6	Water melon	9.9	Dried roast laver	9.6	Cookies and sweets	7.2
7	Dried roast laver	9.4	Red-leaf lettuce	7.3	Orange juice	7.2
8	Red-leaf lettuce	8.0	Deonjang Jjigae	5.9	Soda	7.2
9	Melon (Korean)	7.5	Melon (Korean)	5.9	Toast	7.2
10	Kimchi Jjigae	6.6	Bulgogi, cookies and sweets, raw fish, white bread, toast	5.5	Salad (vegetable), melon	6.5

[1] % of meals
[2] Soybean paste stew with vegetables

Korean stew with soybean paste and vegetables, as frequently as the less acculturated Korean Americans or Koreans did.

All dishes reported by subjects were classified Korean, Eastern, and Western types according to the cooking method used: Korean dishes were defined as the ones prepared by Korean cooking methods with either traditional or foreign ingredients; Eastern dishes were the

Table 5. Types of dishes consumed by Korean and Korean American women

Types of dishes[1)]***	Koreans (n=191)	Korean Americans	
		Less acculturated (n=73)	More acculturated (n=51)
Korean	1987(81.3)[2)]	536(61.0)	315(49.0)
Eastern	73(3.0)	41(4.7)	60(9.3)
Western	385(15.8)	302(34.4)	268(41.7)
Total	2445(100.0)	879(100.0)	643(100.0)

[1)] Types of dishes were classified according to the cooking method used.
[2)] Number of dishes (%)
*** Distributions of three types of dishes are significantly different among three groups by chi-square test ($p<0.001$).

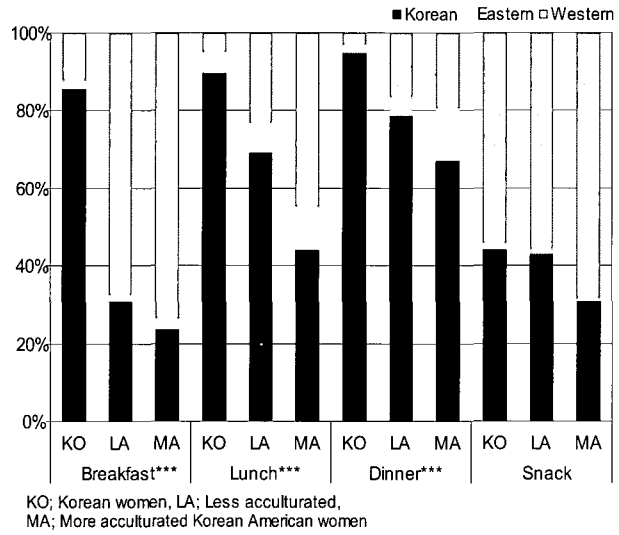

Fig. 1. Types of dishes consumed at each mealtime
*** Distributions of three types of dishes are significantly different among three groups by chi-square test ($p<0.001$)

ones prepared by Eastern methods (Japanese or Chinese), not transformed in Korea; and Western dishes were the ones prepared by Western methods, not transformed in Korea.[28)] Korean Americans ate fewer Korean dishes and more Western dishes than did Koreans ($p<0.001$, Table 5). Within acculturation groups, the more acculturated group consumed fewer Korean dishes and more Western dishes than did the less acculturated group ($p<0.05$). As shown in Fig. 1, differences in the types of dishes consumed were observed at breakfast, lunch, and dinner ($p<0.001$). For lunch and dinner, this significant difference still existed between less and more acculturated group ($p<0.001$). For breakfast, Western dishes were preferred in both groups. In contrary, Korean dishes were preferred for dinner by both groups, even though the less acculturated group ate more Korean dishes than did the more acculturated group.

DISCUSSION

In the current study, the acculturation stage measured by immigration variables influenced nutrient intakes, food consumptions, and types of dishes eaten in Korean American women. The results from the frequency questions of selected food groups and 24-hour recall showed that more acculturated Korean Americans consumed Korean foods less frequently than did less acculturated as well as Koreans. These findings were expectable from the previous report of the study[11)] and confirmed the findings from other studies.[4,5,16)]

Acculturation stage did not have significant effects on macronutrient intake. However, vitamin C intake was higher in more acculturated group and intakes of folate, calcium, iron, and zinc were higher in less acculturated group. Traditionally, dairy product intake of Koreans is not as high as in most Western countries. Therefore, the more acculturated Korean Americans may be expected to consume more dairy products so that their calcium intake might be higher than Koreans. However, in our study, the more acculturated Korean women did not consume more dairy products than either the less acculturated women or Koreans. Higher proportions of the Korean and less acculturated Korean American women reported they consumed milk on the 24 hour recall than the proportion of more acculturated Korean American women, which may be one of the reasons that calcium intake of the more acculturated women was lower than those in the other two groups. Nevertheless, the intake of calcium in Koreans and Korean Americans was still much lower than Adequate Intake of Dietary Reference Intakes[21)] or Recommended Intake of Dietary Reference Intakes for Koreans.[26)] Low calcium intake in Korean American women (about 580 mg/day) was also reported by Park et al. examining dietary intake based on food frequency questionnaire.[18)] The percentage of energy from macronutrients was similar in the two acculturated groups. Kim et al. reported that the high-acculturation group had significantly higher intake of percent energy from total fat, thiamin, vitamin E and folate, while the low-acculturation group consumed greater amounts of sodium, niacin and dietary fiber.[16)] US-born Korean American women (28.8%) had higher intake of percent energy from total fat than did Korea-born women (22.6%).[18)]

Despite lower energy intake, vitamin C and a few mineral intakes were higher in Korean Americans than in Koreans. In an aspect of overall nutrient patterns, the less acculturated women showed better intake profiles than the other groups. However, sodium intake in the less acculturated

women (4,858 mg) was still as high as in the Korean women, which is more than twice as much as the upper limit (2,300 mg) of Dietary Guideline for Americans.[27]

Although there were no large differences in nutrient intake between two acculturation groups of Korean American women, differences among the dishes frequently consumed often emerged. The more acculturated women consumed traditional Korean dishes less frequently, and orange juice and soda more frequently than did the less acculturated. Also, meal time affected the types of dishes that they preferred. Western dishes were preferred in both groups for breakfast, and Korean dishes were preferred for lunch in less acculturated women. However, for dinner, Korean dishes were preferred in both groups even though the less acculturated women consumed more Korean dishes than did the more acculturated women. These meal patterns favored by Korean Americans were consistent with the findings in the previous study.[4] However, while 73% of the bicultural and 90% of the traditional clusters favored Korean foods for dinner, only 27% of the acculturated cluster ate Korean dinners.

The study has several limitations. One of them is that a single day 24-hour recall could not reflect the usual intake of subjects. It was not possible to measure overall diet quality using the well known index such as Healthy Eating Index and Dietary Quality Index.[29] Because small and convenient samples selected from Seoul and California were used for this study, it can be said that they are not representative of all Koreans and Korean Americans. Using two food composition tables might cause some differences in nutrient intakes among groups, besides actual differences in intakes. It was not possible to examine how dietary changes affected health outcomes of Korean Americans since we did not collect data on health status. In spite of these limitations, this study provides the important information about nutrient and food intakes among Korean American women.

In summary, Korean American women had lower intakes of energy and folate, and higher intakes of vitamin C, iron, and percent energy from fat, compared to Korean women living in Korea. Among Korean American women, the more acculturated Korean American women had lower sodium and calcium, and consumed fewer traditional Korean dishes than did the less acculturated women. Korean dishes were preferred for dinner by both acculturation groups while the patterns of dish types favored were different by mealtime. These results suggest that acculturation influenced nutrient intakes, food consumptions, and types of dishes eaten in Korean Americans even though they still kept the dietary tradition of their home county. Benefits derived from consuming foods from both the Western and traditional diet should be emphasized to have an optimal nutrition intake pattern among immigrants. Cultural and health implications of dietary changes need to be studied in the future.

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