Nutritional Status of Korean Americans: Implications for Cancer Risk

Katherine K. Kim, PhD, Elena S.H. Yu, PhD, MPH, Edwin H. Chen, PhD, Nanna Cross, PhD, RD, JaeKyung Kim, MPH, and Ruth Ann Brintnall, MSN

Purpose/Objectives: To examine nutrient intake of Korean Americans, especially those foods and supplements implicated in cancer.

Design: Cross-sectional survey and descriptive analysis.

Setting: Chicago, IL.

Sample: 103 Korean Americans who were between 40 and 69 years of age.

Methods: An instrument, culturally and linguistically adapted from the Health Habits and History Questionnaire, was administered to assess nutrient intake from food and vitamin and mineral supplements. Bilingual interviewers collected data at respondents' homes.

Findings: Relative to their diet in Korea, more than one-third of the respondents reported an increase in the consumption of beef, dairy products, coffee, soda, and bread, as well as a decrease in the intake of fish and rice and other grains. Compared to the general U.S. population included in the National Health Interview Survey (NHIS), Korean Americans had a greater intake of carbohydrates and vitamins A and C and lower intake of total fat, cholesterol, and saturated fat. Moreover, the percentages of calories were higher from carbohydrates and lower from fat, sweets, and alcohol for Korean Americans than those reported by NHIS respondents. Gender, education, and marital status were significantly associated with nutrient intake. The use of daily vitamin and calcium supplements was similar between respondents and those from NHIS.

Conclusions: At their stage of cultural adaptation, the incorporation of a larger quantity of Western food items did not make for a less healthy dietary pattern among respondents. Data showed that Korean Americans continued to consume diets more consistent with Korean than with American food patterns, in as much as greater than 60% of their calories came from carbohydrates and about 16% of calories from fat. As a group, respondents met the recommended dietary guidelines for most nutrients, except for dietary fiber and calcium.

Implications for Nursing Practice: Variation in dietary intake by age, culture, gender, and years in the United States is well accepted. Effective cancer prevention and initiatives for dietary reform call for the incorporation of available research findings and considerable attention to data gaps regarding Korean Americans and other Asian Americans and Pacific Islander populations. Culturally competent, community-based programs should include the reinforcement of positive traditional dietary habits, encourage the adaptation of healthy Western food items, as well as assist minority populations in developing strategies that will effectively correct likely deficiencies in diet.

Key Points . . .

- Culture has a considerable influence in dietary choice, and cultural variability related to dietary choice among Asian American and Pacific Islanders is understudied.
- Korean American respondents in this study continue to consume diets more consistent with Korean than with American food patterns.
- At their stage of cultural adaptation, incorporating Western foods did not make for a less healthy diet among Korean American respondents.
- Culturally competent, community-based educational programs should include the reinforcement of positive traditional dietary habits and encourage the adaptation of healthy Western food.

Over the past two decades, considerable attention has been given to the potential role of dietary factors in the etiology and prevention of cancer (American Cancer Society [ACS], 2000; Nixon, 1990; Ocke et al., 1995; Steinmetz, Potter, & Folsom, 1993). Evidence now suggests that about one-third of all deaths from cancer in the United States are, in part, associated with dietary intake (ACS; American Institute for Cancer Research [AICR], 1997; Doll, 1992; Willett, 1994). According to ACS and AICR, diet may be critical in preventing commonly seen cancers of the breast, colon, rectum, endometrium, and prostate. Consequently, diet is considered the most important modifiable cancer risk factor for all nonsmoking Americans (ACS).

Katherine K. Kim, PhD, is a professor emeritus at Grand Valley State University in Allendale, MI; Elena S.H. Yu, PhD, MPH, is a professor at San Diego State University in San Diego, CA; Edwin H. Chen, PhD, is a professor at the University of Illinois at Chicago; Nanna Cross, PhD, RD, is a clinical nutritionist at the University of Wyoming in Cheyenne; JaeKyung Kim, MPH is a doctoral candidate at the University of Illinois at Chicago; and Ruth Ann Brintnall, MSN, is an assistant professor at Grand Valley State University. *This study was conducted at the University of Illinois at Chicago, with Elena S.H. Yu as the principal investigator, and was funded by a grant from the National Cancer Institute (RO1 CA 49569), Grand Valley State University Grant-in-Aid of Research, and ONS Foundation/Bristol-Myers Oncology Research Grant. (Submitted July 1999. Accepted for publication April 7, 2000.)*

National epidemiologic studies of Americans, such as the National Health Interview Survey (NHIS) and National Health and Nutrition Examination Surveys (NHANES) (Cotugna, Subar, Heimendinger, & Kahle, 1992; Kuczmarski, Flegal, Campbell, & Johnson, 1994), have gathered valuable data regarding Americans' dietary habits. Surveys to date, however, have failed to include adequate numbers of increasingly diverse minority populations other than African Americans and Latinos. In particular, data are lacking on Asian American and Pacific Islanders, although they unquestionably represent the nation's fastest growing minority (Chen, 1998; Koh & Koh, 1993; Lin-Fu, 1993). Research regarding their health needs and health habits consistently has been overlooked and understudied. The neglect occurs despite the fact that the incidence of prostate and lung cancer in Asian American and Pacific Islanders is increasing (Centers for Disease Control and Prevention [CDC], 1999) even as overall cancer rates in the United States decline. Given the reported increase in the number of cancer cases among minorities, population-based research describing the nutritional intake of the growing segment of Korean Americans is compelling because of its potential for cancer prevention.

Health initiatives for dietary changes are further underscored in the Healthy People 2000 objectives (U.S. Department of Health and Human Services, 1992). Published guidelines of several national cancer organizations also specifically call for the promotion of low-fat, high-fiber diets and consumption of five or more servings of fruits and vegetables per day (ACS, 2000; AICR, 1997; National Cancer Institute [NCI], 1996; National Center for Health Statistics [NCHS], 1996). Specific information on dietary patterns and cancer rates in Korean Americans is needed to plan appropriate, culturally congruent prevention programs. Without a thorough understanding of food choices and dietary patterns in the context of culture, optimal interventions for change are not possible. This study is an initial effort to assess and document the nutrient intake of Korean Americans and add to the body of knowledge about this growing population of Asian Americans.

Literature Review

Although development of cancer in humans is multifactorial, a growing body of research implicates dietary factors in etiology and prevention of cancer (ACS, 2000; AICR, 1997; Butrum, Clifford, & Lanza, 1988; Cotugna et al., 1992; NCHS, 1996). The role of culture in food choice is an important factor when studying the relationships among diet, health, and disease. Equally important is the adaptation in food consumption patterns that immigrants make when faced with the scarcity of or difficulty in procuring their traditional food items in Western markets.

Early studies of Asian American adult immigrants (Story & Harris, 1989; Ubukata et al., 1987) revealed that they continue to prefer native foods, whereas their children may prefer a combination of American and traditional foods. This finding suggests that for adult immigrants, traditional diets may be associated with the preservation of ethnic identity. Further study of adult immigrants to the United States may provide a unique opportunity to study relationships among diet, aging, and cancer (Goodwin & Brodwick, 1995).

Most migrant studies of dietary intake report changes in food consumption patterns that mirror a Western diet after immigration. Typically, the dietary alteration consists of a higher intake of meat and lower intake of vegetables among immigrants, accompanied by a higher intake of total and saturated fat and lower intake of vitamins A and C (Lee, Sobal, & Frongillo, 1999). The transition to a more Western diet as a result of migration raises important questions regarding the long-term health effects of dietary change among second- and third-generation immigrants (Story & Harris, 1989; Wu-Jung, 1994). Li and Pawlish (1998) suggested that a Western lifestyle is an important risk factor in the increased incidence of cancer in Asian American and Pacific Islander immigrant groups. Specifically, the gradual shift toward a more "Western" diet was associated with an increase in cancers of the colon, prostate, and breast. Similarly, Wu and Bernstein (1998) described a change in breast cancer incidence after migration, noting a near doubling of risk among immigrants after 10 years of residence in the United States.

Kolonel et al. (1983) described the role of diet in cancer incidence among the diverse populations in Hawaii over a six-year period. A sample of 5,000 respondents 45 years old and older was interviewed to assess dietary intake in five ethnic groups (Caucasians, Japanese, Chinese, Filipinos, and Hawaiians) and to estimate their nutrient intake as well as cancer rates. Pronounced positive associations were seen between ethnic- and gender-specific intakes of fat and the incidence of cancer of the breast, endometrium, and prostate. Cholesterol intake showed a significantly positive correlation with lung and laryngeal cancer. Associations between stomach cancer incidence and the consumption of fish products (particularly dried and salted varieties) and lower vitamin C intake also were noted. Ongoing case-control studies by Kolonel et al. revealed an inverse association between food sources of vitamin A and cancers of the lung; lower urinary tract cancers also were noted to be inversely associated with vitamin A intake. Additional analysis conducted by Kolonel (1988) again supported earlier findings implicating lifestyle and diet as major variables affecting cancer incidence among the different Asian American and Pacific Islander groups.

Obesity and alcohol use have been associated with increased cancer risk. Obesity has been associated with increased risk for cancer of the endometrium (Gredmark, Kvint, Havel, & Mattsson, 1999), gall bladder, and breast in postmenopausal women (Trentham-Dietz et al., 1997) and cancer of the colon in men and women (Shike, 1999). Excessive alcohol intake (especially in smokers) increases the risk for cancer of the oral cavity, larynx, esophagus, and liver (Longnecker & Enger, 1996). Moderate alcohol intake increases the risk for cancers of the colon, rectum (Kato et al., 1999; Shike), and breast (Zhang et al., 1999).

Gender differences in cancer incidence are well studied and show a substantial variation by ethnic groups (ACS, 2000). Gender as a factor in dietary preference also has been reported (Cotugna et al., 1992; Millen et al., 1997; Tillotson, Bartsch, Gorder, Grandits, & Stamler, 1997). In fact, Millen et al., who reported a greater proportion of

women than men met the recommended intake of carbohydrates, total and saturated fats, cholesterol, vitamin A, beta carotene, and sodium, observed significant gender differences. In contrast, a greater portion of men than women met guidelines for monounsaturated fat, fiber, vitamin B-12, folic acid, and calcium. Millen et al. further suggested that both sexes might have unique needs for nutritional information that require tailored interventions.

Limited research has been conducted on the relationship between nutrient intake and gender, educational level, and marital status. Moreover, apparent interactions exist among these and other factors such as age, income, and employment status. A nationwide survey to evaluate intake of fruits and vegetables showed significantly higher intake in those who were single, female, college graduates, in higher income brackets, and responsible for food shopping (Thompson et al., 1999). Married women contributed more to their husband's dietary quality because of their role in food selection and preparation (Schafer, Schafer, Dunbar, & Keith, 1999). In particular, older men who lived alone were found to consume diets of poorer quality than those who lived with a spouse, primarily because of lower calorie intakes (Davis, Murphy, Neuhaus, & Lein, 1990).

Much interest currently exists in understanding the role of various nutrients and dietary components in cancer prevention (Hennekens, 1994; Willett, 2000). Some evidence for a protective association of specific nutrients in the reduction of colon, lung, breast, and gastrointestinal cancers has been reported (Blot et al., 1995; Freudenheim et al., 1996; Mezzetti et al., 1998; Patterson, White, Kristal, Neuhouser, & Potter, 1997; Willett, 2000; Ziegler, Mayne, & Swanson, 1996). Hennekens postulated a protective role for antioxidant vitamins, including beta-carotene (provitamin A), vitamin E, and vitamin C through the prevention of tissue-damaging effects of free radicals. Study results revealed, however, that beta-carotene did not appear to influence lung cancer risk. In a study of cervical neoplasia, Potischman (1993) reported an association between vitamin C intake and reduced risk for dysplasia, in-situ cancer, and invasive cervical disease among smokers. Hunter et al. (1993) found that large intakes of vitamin E and C were not protective against breast cancer, but diets low in vitamin A increased the risk of breast cancer. Jain, Miller, and To (1994) concluded that higher intake of saturated fats increased the risk of death from breast cancer and noted an improved survival with increased intake of beta-carotene and vitamin C.

Current cancer research uses a combination of epidemiologic research, clinical intervention, and molecular biology to understand nutrient benefits and risks. Such an approach aims at understanding the amounts and kinds of nutritive and non-nutritive components of food that are effective in cancer prevention (Garewal et al., 1999; Surh, 1999). The potential anticarcinogenic mechanisms of phytochemicals at the cellular level is an active area of research (Hasler & Blumberg, 1999; Hecht, 1999). Examples of phytochemicals and the primary food sources include isoflavones in soy products, theocyanates in cruciferous vegetables, and phenols and flavenoids in fruits and vegetables (Hasler & Blumberg). NCI has identified a number of food components (selenium, lycopene, vitamin E, and soy isoflavones) for evaluation in clinical preventive trials in men at high risk for prostate cancer (NCI, 1999).

Although the contribution of specific nutrients and phytochemicals in cancer prevention still is not certain, the consistency in the reported findings about the importance of an increased consumption of dietary fiber, fruits, and vegetables has been remarkable (Steinmetz & Potter, 1996). Indeed, a widespread population effort to adopt the existing guidelines for diet and health recommendations for cancer prevention that include consumption of five or more servings of fruits and vegetables and low intake of fat offers great promise to substantially reduce common cancers in Americans (AICR, 1997).

Methods

Sample and Setting

The data for this article come from a developmental project of cancer control among Asian Americans. The nutrition study population consisted of 103 Korean men and women. Inclusion criteria were Korean Americans between ages 40 and 69 who lived in uptown Chicago, where the largest concentration of Korean Americans resides.

Using a two-stage probability sampling method (Levy & Lemeshow, 1991) to select survey respondents, a random sample was drawn from a sampling frame of Korean-American households that was generated by snowballing lists of Korean surnames obtained from diverse sources, including telephone directories, Korean churches, cultural leaders, Korean community service organizations, and names supplied by a survey sampling firm. Within each household, one age-eligible member was selected randomly for interview. Of 202 eligible individuals, nutrition interview data were collected successfully from 52% (N = 105) of the individuals listed in the sampling frame. The major reasons for nonparticipation were refusal (19%), lack of time because of long hours of work or multiple jobs (18%), other members in the family did not allow an interview because of unfamiliarity with surveys (4%), health problems (4%), and inability to contact after at least six callbacks on separate days and times (3%). Two interview records were eliminated because of considerable missing or questionable data. Hence, the nutritional data analyses were based on responses obtained from 103 respondents.

Instruments

The research instrument was culturally and linguistically adapted from the Health Habits and History Questionnaire (HHHQ) included in the 1987 NHIS (Block et al., 1986; Block & Subar, 1992). The original questionnaire included food frequency items as well as questions about vitamin and mineral supplement intake. A new list of ethnic-specific food items that captured the cultural diet of the study population was added. This list included items on the use of popular Korean health foods, such as ginseng and antler powder. Each respondent's height and weight were measured.

Block and Subar (1992) reported that the food frequency questionnaire used in the 1987 NHIS provided estimates of "usual" intake rather than intake based on the 24-hour intake method. The food frequency method is more appropriate than other survey methods when re-

searching the relationship between diet and disease. In addition, the nutrient intake data from this study method can be used to compare demographic subgroups and describe the mean and distribution of nutrient intake.

Because participants in this study were predominantly new immigrants with low socioeconomic backgrounds, the latest methods developed from cognitive psychology were employed to develop the survey instrument (Sudman, Bradburn, & Schwarz, 1996) in order to elicit ethnically relevant questions. First, the original English version of the HHHQ was translated into Korean. Second, a back translation from Korean to English was made to ascertain that the original meaning of the English version was not lost in the process of translation. Third, revisions and modifications were made by applying cognitive psychology methods used in the Questionnaire Design and Research Laboratory at NCHS (1985). The cognitive-psychology methods used included such strategies as the think-aloud method, the paraphrasing method, and the retrospective protocol method, among others. To find the optimal choice of words, experts such as nutritionists, physicians, nurses, and behavioral and social scientists were consulted. Random probes were applied to select concepts that were unusually difficult to translate. Finally, parallel pretests and field tests were conducted during the final phase of instrument development, using individuals who were like the targeted survey respondents but resided very far away from the research site.

Data Collection Procedures

Korean-English bilingual interviewers were recruited and trained for one week using both the mock-interview method and live practice interviews with individuals who had similar demographic profiles as the targeted respondents. The interviewers were graduate students at the University of Illinois at Chicago. A week before the interviews were to be conducted in the community, all major Korean-language newspapers were contacted and informed of the upcoming survey and its purpose, sponsorship, and investigators. All individual households in the sampling list received a letter informing them that they would be contacted by phone and that interviewers would be asking how many people in the household were between the ages of 40 and 69 years. The potential respondents also were informed that one person in the specified age range would be randomly chosen for face-to-face interview and that the interview would be confidential. Interviewers contacted eligible respondents directly by phone to arrange an interview in the respondent's home.

The institutional review boards of the University of Illinois at Chicago and San Diego State University approved the study. Informed consent was obtained prior to interview, with full assurance given to respondents regarding response confidentiality, voluntary participation, and potential benefits. All interviewers carried an identification card. Respondents were informed by prior mail communication that they should ask to see the interviewer's identification card before agreeing to be interviewed. The phone number of the research office also was listed on the card in case respondents had any questions about the study or wanted to contact the project directors.

Because the food frequency questions in the HHHQ contained a number of items that were widely known to be foods that Korean Americans normally would not eat, the interview burden was reduced by replacing these food items with commonly eaten Korean foods. Research team members worked with Korean American nutritionists to ensure that the substituted Korean foods contained a comparable amount of nutrients. Each interviewer was equipped with a large canvas bag filled with a standard set of measuring tools and equipment, including a weight scale. The nutritional-intake interview was conducted with the aid of selected food models, U.S. measuring cups and spoons, ethnic rice bowls, as well as an album containing 5" x 7" color photos of Korean food items with different brand names and container sizes. Whenever respondents reported portion size using their household containers, interviewers converted them onsite into units of the U.S. household measuring cups and spoons. This was necessary to ensure accuracy of the quantity of estimated food intake. Ethnic rice bowls, glasses, and the food models also were calibrated to facilitate conversion to the standardized U.S. household measurements. All respondents were weighed in ordinary summer clothing, and their height was measured without shoes. Scales were standardized to one weight.

Data Analysis

The amount of each nutrient consumed by respondents was computed using the DIETSYS Version 3.0, a nutrient database developed by NCI and used in the 1987 NCHS Epidemiological Study (NCI, 1994). Ethnic foods were added to the nutrient database using food composition tables from Korea (Korean Public Health Institute, 1995). After computation of the amount of daily nutrient intake, further statistical analyses were performed using the SAS® 6.0 program. Two-sample t-tests were used to compare two group means.

Results

Sample Characteristics

Table 1 shows the sample characteristics. Participants' mean age was 56.4 years old. Forty-one were males (40%), and about one-third of the respondents (31%) either had some college education or had graduated from college. Most of the respondents were educated in Korea. Seventy-eight percent of respondents were married. As for language skill, 65% of the sample stated that they spoke English poorly or not at all. Eighty-five percent of the respondents were Christians, and the average length of residency in the United States was 8.1 years (SD = 5.4). About 95% of the respondents were born in Korea, and most of them (77%) came to the United States after 1980. The percentages of men and women who were current smokers were 39% and 7%, respectively.

Changes in Diet Since Immigration to the United States

Table 2 presents qualitative changes in the consumption of selected foods and beverages among men and women since immigrating to the United States. More than one-third of respondents reported an increased consumption of beef, fruit, dairy products, bread, soda, or coffee, and one-third reported a decrease in consumption of fish and rice or other grains.

Table 1. Sample Characteristics

Characteristics	n	%
Age (years)		
$\bar{X}$ = 56.4	–	–
SD = 7.6	–	–
Range = 40–69	–	–
Gender		
Male	41	40
Female	62	60
Education		
≤ 12 years	71	69
> 12 years	32	31
Marital status		
Married	80	78
Not married	23	22
Spoken English proficiency		
Not at all or poorly	67	65
Moderately or well	36	35
Religion		
Christian	88	85
Buddhist	4	4
None	11	11
Length of residency in United States (years)		
$\bar{X}$ = 8.1	–	–
SD = 5.4	–	–
Range = 1–35	–	–

N = 103

Nutrient Intake

Table 3 compares the nutrient intake of Korean Americans with that of NHIS respondents (Block & Subar, 1992). When compared to NHIS male respondents, Korean American men had a lower intake of calories, total fat, cholesterol, and saturated fat ($p < 0.001$) but greater intake of carbohydrates and vitamins A and C ($p < 0.01$). A similar trend was observed among females; namely, intake of total fat, cholesterol, and saturated fat was lower ($p < 0.001$). But, intake of protein, carbohydrate, dietary fiber, and vitamins A and C was greater ($p < 0.05$) for Korean females than for NHIS female respondents.

Except for dietary fiber, the nutrient intake of Korean Americans was within the Food and Nutrition Board, National Research Council guidelines (1989) and Healthy People 2000 objectives (NCHS, 1996). Mean dietary fiber intake of Korean American men and women was only 11.9 g and 11.3 g, respectively, compared with the recommended intake of 20–30 g.

Table 4 compares the percentages of intake from carbohydrates, fat, protein, sweets, and alcohol to the NHIS sample (Block & Subar, 1992). The percentage of calories from carbohydrates, protein, and fat was better than the recommendations of the U.S. dietary goals of 50%–60% for carbohydrates and ≤ 30% for total fat (National Research Council, Committee on Diet and Health, 1989). Mean intake of carbohydrates was greater than 60% and intake of fat about 16%, and the percentage of calories from alcohol was less than 5%. For Korean American men and women, the percentage of calorie intake from total carbohydrates was significantly greater than that reported for NHIS respondents ($p < 0.001$). On the other hand, their percentage of calorie intake from fat, sweets, and alcohol was significantly less than that of NHIS respondents ($p < 0.001$). Korean American women also consumed diets with a greater percentage of protein compared to NHIS women ($p < 0.001$).

Relationship Between Dietary Intake and Select Demographic Characteristics

Table 5 shows the mean dietary intake of nutrients by gender, education, and marital status. Korean men consumed a significantly greater amount of calories, protein, carbohydrates, total fat, and cholesterol than did Korean women ($p < 0.05$). Intake of calories, protein, total fat, and cholesterol was significantly positively related to educational level. Respondents with more than 12 years of education consumed a greater amount of these nutrients compared to respondents with less than or equal to 12 years of education ($p < 0.05$). Married respondents consumed a significantly greater amount of calories, protein, carbohydrates, dietary fiber, vitamins A and C, and calcium when compared to unmarried respondents ($p < 0.05$).

Table 2. Percent of Korean Americans Reporting Changes in Diet Since Immigration to the United States

Item	Decreased Intake	Same Intake	Increased Intake	Do Not Consume
Beef	5%	19%	75%	1%
Pork	30%	25%	20%	24%
Chicken	13%	35%	38%	15%
Fish	39%	34%	26%	1%
Eggs	18%	52%	20%	10%
Fruits	10%	32%	58%	0%
Vegetables	18%	46%	37%	0%
Dairy products	5%	29%	53%	13%
Rice/grains	37%	60%	3%	0%
Bread	6%	29%	55%	10%
Soda	8%	23%	56%	13%
Coffee	16%	34%	35%	16%
Alcohol	26%	35%	6%	33%

N = 103

Table 3. Nutrient Intake by Korean Americans and National Health Interview Survey (NHIS) Respondents by Gender

		Men				Women			
		Korean		NHIS		Korean		NHIS	
Nutrients	Dietary Guidelines	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Calories (kcal)	Achieve or maintain ideal body weight	1,876	80.3***	2,162	23.3	1,140	46.9	1,408	11.9
Protein (gm)	10%–20% of calories	83.4	5.9	86.5	0.9	66.9	3.4***	56.0	0.5
Carbohydrate (gm)	50%–60% of calories	290.7	13.5***	225.2	2.6	223.3	7.7**	159.1	1.5
Total fat (gm)	≤ 30% of calories	35.5	3.4***	90.2	1.2	25.9	1.9***	57.8	0.6
Cholesterol (mg)	< 300 mg	186	21.9***	433	7.1	131	12.5***	270	3.8
Saturated fat (gm)	< 10% of calories	10.1	1.16***	32.8	0.47	6.7	0.58***	20.1	0.24
Dietary fiber (gm)	20–30 g	11.9	0.71	12.7	0.17	11.3	0.55*	10.0	0.12
Vitamin A (IU)	Men 5,000 IU Women 4,000 IU	9,649	1,317**	5,943	114	7,598	827*	5,514	94
Vitamin C (mg)	Nonsmoker 60 mg Smoker 100 mg	155	11.6***	104	2.0	148	7.7***	103	1.6
Calcium (mg)	800 mg	864	58	770	13	723	46	643	9

Note. From "Estimates of Nutrient Intake From a Food Frequency Questionnaire: The 1987 National Health Interview Survey," by G. Block & A.F. Subar, 1992, *Journal of the American Dietetic Association, 92,* 969–977. Copyright 1992 by the American Dietetic Association. Adapted with permission.

Data from 50–64-year-old respondents in the 1987 NHIS.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Use of Vitamin, Calcium, and Herb Supplements

Table 6 shows the percentage of respondents who reported using daily supplements of vitamins and calcium in the prior 12 months. The pattern of use was similar to that found for the national U.S. sample (Subar & Block, 1990). Nearly one-quarter of respondents were taking daily supplements. Multiple vitamins were the most common supplement (19%), followed by vitamin C (10%) and calcium (5%). No one was taking vitamin A by itself daily.

In addition, respondents were asked whether they had ever used ginseng products and antler powder (substances widely used as food tonics in Korea) in the prior 12 months. The percentage of respondents reporting the use of these substances for health was 51% and 30%, respectively. Some 14% of respondents also reported the use of herbal remedies other than ginseng products and antler powder in the prior 12 months.

Table 4. Comparison of Energy Distribution of Korean Americans and National Health Interview Survey (NHIS) Respondents

	Men				Women			
	Korean		NHIS		Korean		NHIS	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Carbohydrate	63.0	1.84*	42.1	0.23	64.2	1.37*	45.5	0.23
Protein	17.4	0.67	16.3	0.08	18.6	0.57*	16.1	0.08
Fat	16.6	1.10*	37.1	0.22	16.0	0.87*	36.6	0.21
Sweets	1.8	0.24*	12.0	0.25	1.5	0.28*	10.6	0.23
Alcohol	2.2	0.66*	6.1	0.28	0.6	0.41*	2.6	0.15

Note. From "Estimates of Nutrient Intake From a Food Frequency Questionnaire: The 1987 National Health Interview Survey," by G. Block & A.F. Subar, 1992, *Journal of the American Dietetic Association, 92,* 969–977. Copyright 1992 by the American Dietetic Association. Adapted with permission.

Data from 50–64-year-old respondents in the 1987 NHIS.

* $p < 0.001$

Table 5. Nutrients Consumed by Korean Americans by Gender, Education, and Marital Status

	Gender				Education				Marital Status			
	Men (n = 41)		Women (n = 62)		> 12 years (n = 32)		≤ 12 years (n = 71)		Married (n = 80)		Not Married (n = 23)	
Nutrients	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Calories (kcal)	1,876	80.3**	1,410	47.0	1,761	97.5*	1,521	52.3	1,689	53.2**	1,271	80.7
Protein (g)	83	5.9*	67	3.4	87	7.6*	67	2.9	77	3.7*	60	5.8
Carbohydrate (g)	291	13.6**	223	7.8	256	11.8	247	10.0	264	8.5**	201	15.1
Total fat (g)	36	3.4*	26	1.9	37	4.2*	26	1.8	31	2.1	24	3.4
Cholesterol (mg)	186	21.9*	131	12.5	199	27.2*	132	11.2	160	13.7	127	22.3
Dietary fiber (g)	12.0	0.7	11.4	0.5	12.4	0.8	11.3	0.5	12.3	0.5**	9.2	0.6
Vitamin A (IU)	9,649	1,318	7,598	827	9,872	1,264	7,757	881	9,065	888*	6,152	889
Vitamin C (mg)	156	11.6	149	7.7	161	12.7	147	7.6	158	7.8*	127	8.9
Calcium (mg)	864	57.8	723	46.3	866	72.0	740	41.5	838	41.5**	575	61.7

* $p < 0.05$
** $p < 0.01$
N = 103

Table 6. Percent of Korean Americans and 1987 National Health Interview Survey (NHIS) Respondents Using Daily Supplement

Supplements	Korean Americans (N = 103)	NHIS Respondents (N = 22,080)
Any supplement	23%	23%
Multiple type	19%	17%
Vitamin A	0%	1%
Vitamin C	10%	8%
Calcium	5%	6%

Data from 18 years and older respondents.

Note. From "Use of Vitamin and Mineral Supplements: Demographics and Amount of Nutrients Consumed," by A.F. Subar & G. Block, 1990, *American Journal of Epidemiology, 132,* 1091–1101. Copyright 1990 by Johns Hopkins University School of Hygiene and Public Health. Adapted with permission.

Anthropometric Measurements

The body mass index (BMI) was calculated using the formula weight (kg)/height (m^2). The mean BMI of Korean men and women was 23.2 (SD = 3.4) and 23.7 (SD = 3.2), respectively. To examine the proportion of respondents who were overweight, the criteria of ≤ 27.8 for men and ≤ 27.3 for women were used (Kuczmarski et al., 1994; Najjar & Rowland, 1987). The BMI of ≤ 18.5 was used as a criterion for men and women who were underweight (U.S. Department of Health and Human Services, 1998). The percentages of Korean men and women who were underweight were 7.3% and 6.5%, respectively. The percentages of Korean American men and women who were overweight were 5% and 13%, respectively, compared to 33% in the total U.S. population (Kuczmarski et al.). More than four-fifths (> 80%) of respondents had normal body weight.

Discussion and Implications

Culture greatly influences dietary intake, which is a significant factor in cancer risk. To that end, the growing ethnic diversity in the United States presents new health challenges. Continued research into diverse groups, including Asian American and Pacific Islander subgroup populations, is essential to realizing Healthy People 2000 goals.

This study reveals that, in general, Korean Americans in Chicago followed a diet that met the U.S. dietary goals more closely than NHIS respondents (Block & Subar, 1992). Several trends were noteworthy. Gender, education, and marital status were important factors associated with nutritional intake. Among newly migrated respondents, westernization of diet was observed. This was evidenced by increased consumption of beef, chicken, dairy products, breads, coffee, and soda and decreased intake of traditional food items, such as fish and rice/grains. In spite of some westernization of diet, Korean Americans' dietary patterns were more similar to Korean food patterns than American. The fact that the mean length of residency in United States among respondents was only eight years may explain this finding. The traditional Korean food pattern is plant-based, with rice, soybeans, vegetables, and pickled vegetables forming the core of the diet along with small amounts of meat, eggs, milk, and fruit. The nutrient intake of Korean Americans in this study reflects the traditional Korean diet (Tchai, 1993), which is low in animal fat and cholesterol and high in total carbohydrates.

The mean calcium intake of respondents was slightly lower than the 1989 U.S. recommended daily amount of 800 mg (Food and Nutrition Board, National Research Council, 1989) but much lower than the more recent 1997 dietary reference intake of 1,200 mg for those who are 51 years old and older (Food and Nutrition Board, Institute of Medicine, 1997). Furthermore, the calcium intake of unmarried Korean women respondents showed a mean of only 575 mg. Calcium intakes were similar, however, for Korean Americans and NHIS respondents. Primary sources of calcium in the traditional Korean diet are dried anchovies, milk, cabbage, and tofu (Kim, Moon, & Popkin, 2000). Korean Americans use more milk than native Koreans because of the availability and lower cost of milk in the United States.

The use of nutritional supplements, including vitamins and calcium, among Koreans paralleled the NHIS findings (Subar & Block, 1990). The most common form of nutritional supplement in both samples was multivitamins. Of note, the use of ginseng products and antler powder was relatively common among Korean Americans, suggesting that tradition and cultural therapies were important in self-care. Antler powder is taken for general health promotion (*mom bo sin*) or to treat general feelings of weakness. Koreans consider it an important source of iron (Lee & Ahn, 1987). Studying the biochemical composition and therapeutic values of these ethnic products may prove beneficial for the advancement of knowledge about herbs and health.

When compared to NHANES III respondents, relatively few of the Korean American men and women were overweight. In contrast, age-adjusted BMI from NHANES I, II, and III showed an increasing BMI in 25%–33% of adult respondents from 1971–1991 (Kuczmarski et al., 1994). BMI measurements of the Koreans met the Healthy People 2000 goal of no greater than 20% prevalence of obesity among adults over 20 years of age (NCHS, 1996).

Most study respondents were first-generation immigrants; thus, they share the health risk for residents of their country of origin as well as those of their new homeland. Healthcare providers who serve migrated groups must be aware of variations in common cancer sites by country of origin. Moreover, providers who serve Korean Americans need to be informed that cancers of the stomach and liver are the leading cancers found in native-born Koreans (Kim et al., 2000). Careful longitudinal study of immigrants, such as Korean Americans and other Asian American and Pacific Islander subpopulations, offers an exceptional opportunity to study the effects of lifestyle and environment on cancer risk. Such approaches are useful for targeting modifiable risk factors. Specific research on immigrant populations must be directed toward specific subgroups as well as the aggregate Asian American and Pacific Islander population to avoid stereotypic assumptions regarding cancer incidence and risk. In light of earlier data showing evidence of changing cancer incidence within immigrant

Asian American and Pacific Islander populations, future studies of this population must include a sizable number of Korean Americans to allow for testing the hypotheses concerning the influence of acculturation on diet and cancer risk. Particular attention to second- and third-generation immigrants will be necessary.

A major limitation of this study was the small sample size. This limitation does not pose a significant threat to the validity of the findings in light of the homogeneity of the Korean immigrants living in uptown Chicago. Hence, the imprecision of the point estimates reported in this article should not detract health educators from taking immediate steps to undertake health-promotion and disease-prevention activities for this minority population.

Although further scientifically valid and culturally sensitive research is called for to meet national goals of improved dietary health for Americans, substantial evidence already exists to indicate that nutrition is an important factor in cancer prevention. Moreover, the variation of dietary intake by age, culture, gender, and years in the United States is well accepted. Effective cancer prevention and initiatives for dietary reform call for the incorporation of available research findings and considerable attention to fill the data gaps regarding Korean Americans and other Asian American and Pacific Islander populations.

Culturally competent, community-based programs that specifically target Korean populations should be established. Planned nutritional intervention programs should include the reinforcement of positive traditional dietary habits, as well as strategies to correct deficiencies in dietary fiber and calcium. The more traditional Korean plant-based food pattern should be promoted in Korean Americans because it is low in animal fat and high in carbohydrates. This food pattern has been associated with a low risk for cancer of the breast, colon, and prostate. On the other hand, a high intake of pickled vegetables (*kim chi*) in Korea has been associated with cancer of the stomach (Lee, Park, Yoo, & Ahn, 1995). Therefore, the need for individual food intake assessment is essential prior to intervention.

Intervention programs for Korean Americans should target healthcare professionals through journals and newsletters. Culturally appropriate educational materials should be developed to preserve healthy components of the traditional Korean diet. Furthermore, educational materials should be made available in Korean, as only 35% of the subjects in this study reported being fluent in English. Other methods of targeting health messages include local Korean media (e.g., TV, radio, newspapers), churches, and community centers because Korean Americans reported these as their preferred sources of receiving health information (Cho, Kim, & Yu, 1998). Mass media strategies also were successful in promoting a healthy diet in Korea (Kim et al., 2000).

Summary

Routine assessment of nutrient intake is an essential role for nursing when caring for culturally diverse populations. Within the Korean American community, utilization of clinical dieticians or ethnic community experts may be necessary to fully understand individual risks and promote healthy diet. In providing dietary counseling, nurses should support strengths in the Korean diet. Specific strategies should include current nutritional guidelines for healthy living, such as (a) selecting most foods from plant sources, (b) limiting intake of high-fat foods, particularly from animal sources, (c) remaining physically active and maintaining a healthy weight, and (d) limiting consumption of alcoholic beverages (Willett, 2000). Culturally competent, community-based programs should encourage the adaptation of healthy Western food items as well as assist minority populations to develop strategies that will effectively correct likely deficiencies in diet.

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Author contact: Kimk@gvsu.edu with copy to editor at rose_mary@earthlink.net

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- Asian/Pacific Islander American Health
  http://www.nlm.nih.gov/pubs/cbm/asianam.html
- Culturally Competent Care for Southeast Asians/Asian Groups
  http://www.sunyit.edu/library/html/culturedmed/bib/hispanic/

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