



■ Original Article

# Prevalence of and Risk Factors for Diseases in Korean Americans and Native Koreans Undergoing Health Checkup

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**Background:** Korean Americans constitute the fifth largest subgroup in the Asian American population. Despite their increasing population, research and guidelines regarding their health status assessment and disease screening are lacking. This study aimed to compare the prevalence of diseases in Korean Americans and native Koreans to determine the risk factors and guidelines for disease screening.

**Methods:** Patients who visited the Gangnam Severance Hospital from February 2010 to May 2015 for a health checkup were enrolled in this study. Baseline characteristics, laboratory data, and the organs (stomach, colon, thyroid, brain, prostate, lung, liver, kidney, pancreas, adrenal gland, and heart) of patients were examined. Data regarding patients' dietary patterns were also obtained. Overall, 1,514 Korean Americans (group 1) and 1,514 native Koreans (group 2) were enrolled.

**Results:** The following diseases were more prevalent in group 1 than in group 2: reflux esophagitis (12.9% vs. 10%), gastric ulcer (3.0% vs. 5.5%), colorectal polyp (37.7% vs. 28.7%), hemorrhoids (32.2% vs. 29.9%), and benign prostatic hyperplasia (30.2% vs. 14.3%). Although not statistically significant, coronary artery disease has a high prevalence rate of >20% in both groups. Dietary patterns were not significant between the two groups.

**Conclusion:** This study showed that the prevalence of several diseases in Korean Americans differed from that observed in native Koreans. Therefore, a foundation for setting up new guidelines for disease screening among Korean Americans is established.

**Keywords:** Korean Americans; Health Status; Disease; Screening

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## INTRODUCTION

In Korea, cancer is the leading cause of death among adults aged over 30 years. Therefore, its prevention is extremely important. The implementation of a 10-year plan for national cancer control has contributed to the prolongation of life by reducing cancer incidence and mortality among Koreans.<sup>1)</sup> Korean guidelines for screening patients with stomach, liver, colorectal, and breast cancer were developed by health professionals from various academic societies.<sup>2)</sup> With efforts provided by the Korean government, native Koreans can easily avail health screening services for the early detection of cancer or other chronic diseases. The number of immigrants in the United States is continuously increasing, especially from Asia. Korean Americans constitute the fifth largest Asian American subgroup with a population of approximately 18.2 million in 2011. Korean Americans are supplied with insufficient health service, research, and policy. Even though cancer is the leading cause of death among Korean Americans, cancer screening rates among Korean Americans are consistently lower than the goals specified in the Healthy People 2020 program.<sup>3,4)</sup> Korean Americans are confronted with multiple barriers for accessing cancer screening information and services, including low English-language proficiency levels that can lead to health/medical literacy issues and lack of health insurance.<sup>5)</sup> Additionally, only a few studies have focused on cancer incidence in Korean Americans.<sup>5)</sup> These barriers have prompted Korean Americans to visit South Korea to receive effective healthcare services. Despite the rapid influx of Korean Americans coming to Korean to avail healthcare services, whether they have similar disease prevalence with native Koreans and whether the Korean guidelines for screening cancer are applicable remains unclear. Hence, we aimed to compare the prevalence of diseases among Korean Americans and native Koreans to determine the risk factors and guidelines for disease screening.

## METHODS

### 1. Study Population and Data Collection

A cross-sectional study was conducted on patients who presented for a health checkup at Gangnam Severance Hospital, Yonsei University College of Medicine from February 2010 to May 2015. We gathered data of 1,514 Korean Americans who voluntarily visited South Korea for health status assessment through the health checkup program. For patients repeatedly screened every few years, the first screening results were used for this study. Then, we selected 1,514 age-sex-matched native Koreans living in South Korea who underwent the same health assessment at our center during the same period. Written informed consent was obtained from all participants. Patients' baseline characteristics, laboratory data, and organs (stomach, colon, thyroid, brain, prostate, lung, liver, kidney, pancreas, adrenal gland, and heart) were examined. Esophagogastroduodenoscopy and colonoscopy were performed to determine the occurrence of any gastrointestinal disease. Additionally, thyroid ultrasonography, transrectal prostate ultrasonog-

raphy, brain computed tomography (CT)/magnetic resonance imaging, abdominal pelvic CT, high-resolution CT of the lung, and coronary CT angiography were performed to identify the occurrence of other diseases. Moreover, data on patients' dietary patterns were obtained using the health checkup medical questionnaire. Dietary patterns were estimated using the 20-item questionnaire, comprising the following items: three meals a day; meals at the appointed time; time for one meal; overeating; eating out; water drinking (6–8 cups of water); interest in nutrition; frequency grain, protein, vegetable, vegetable oil, fruit, milk and dairy product, sugary food, salty food, greasy food, egg yolk, coffee and infusion, and hot and spicy seasoning consumption; and drinking frequency. Data of all participants were assessed, and differences between Korean Americans and native Koreans were compared.

### 2. Ethics Statement

The present study protocol was reviewed and approved by the Institutional Review Board of Gangnam Severance Hospital (approval no., 2018001). Written informed consents were obtained.

### 3. Definition and Assessment of Diseases

Body mass index (BMI) was measured based on patients' height and weight. Patients with BMI of  $>25 \text{ kg/m}^2$  were considered obese. Patients were diagnosed with hypertension if their systolic blood pressure was  $\geq 140 \text{ mm Hg}$  and diastolic blood pressure was  $\geq 90 \text{ mm Hg}$ . Lipid profiles were classified as follows: high total cholesterol ( $\geq 240 \text{ mg/dL}$ ), high low-density lipoprotein (LDL) ( $\geq 160 \text{ mg/dL}$ ), low high-density lipoprotein (HDL) ( $< 40 \text{ mg/dL}$ ), and high triglycerides (TG) ( $\geq 200 \text{ mg/dL}$ ). Reflux esophagitis, peptic ulcer, gastric cancer, colorectal polyp, colorectal cancer (CRC), and hemorrhoid were diagnosed through endoscopic or pathological examination. Coronary artery disease (CAD) was diagnosed using coronary CT angiography and was assessed using the Agatston score. Other diseases were also diagnosed using imaging studies.

### 4. Statistical Analysis

A 1:1 propensity score matching between Korean Americans and native Koreans was performed. A propensity score of Korean Americans was estimated using a logistic-regression model fit with age and sex. A propensity-score-matched cohort was created by attempting to match each American Korean with native Korean (a 1:1 match). A nearest-neighbor-matching algorithm was used to match patients. Categorical data are expressed as numbers and percentages, whereas continuous data are expressed as means and standard deviations. Paired t-test and generalized estimating equations were used to compare the prevalence of diseases and categorical variables. A P-value of  $< 0.05$  was considered statistically significant. All statistical analyses were performed using SAS statistical software package ver. 9.2 (SAS Institute Inc., Cary, NC, USA).

## RESULTS

### 1. Patient's Baseline Characteristics and Laboratory Results

A total of 1,514 Korean Americans visited the Gangnam Severance Hospital for health checkup from February 2010 to May 2015, and 1,514 native Koreans were selected as age-/sex-matched controls to overcome possible selection bias. Therefore, 3,028 participants were enrolled in this study. The mean age of Korean Americans and native Koreans were 53.6±8.4 years and 53.7±8.3 years, respectively. The ratio of female and male Korean Americans and native Koreans were 47.4:52.6 and 46.8:53.2, respectively. High blood pressure, high cholesterol, and high LDL were more frequent among Korean Americans

**Table 1.** Characteristics of native Koreans and Korean Americans

Characteristic	Native Koreans (n=1,514)	Korean Americans (n=1,514)	P-value
Age (y)	53.62±8.43	53.68±8.33	0.1389
Sex			0.248
Male	709 (46.83)	717 (47.36)	
Female	805 (53.17)	797 (52.64)	
Obesity	514 (34.11)	480 (31.87)	0.1838
High blood pressure	303 (20.12)	356 (23.62)	0.0177
High fasting glucose level	134 (8.89)	103 (6.83)	0.0311
High total cholesterol	207 (13.74)	254 (16.85)	0.0179
High low-density lipoprotein	200 (13.27)	249 (16.52)	0.0122
Low high-density lipoprotein	296 (19.64)	241 (15.99)	0.0091
High triglycerides	238 (15.79)	181 (12.01)	0.0028

Values are presented as mean±standard deviation or number (%). Calculated by paired t-test and generalized estimating equations after matching for age and sex.

**Table 2.** Laboratory data of native Koreans and Korean Americans

Laboratory data	Native Koreans (n=1,514)	Korean Americans (n=1,514)	P-value
Hemoglobin (g/dL)	14.43±1.41	14.36±1.45	0.0763
White blood cell (10 <sup>3</sup> /μL)	5.99±1.58	6.11±1.75	0.039
Aspartate aminotransferase (IU/L)	24.64±11.69	25.23±24.82	0.3976
Alanine aminotransferase (IU/L)	24.33±16.49	26.52±40.42	0.0505
Gamma glutamyl transferase (IU/L)	35.82±71.37	31.23±35.17	0.0241
Creatinine (mg/dL)	0.77±0.19	0.78±0.2	0.0158
C-reactive protein (mg/L)	1.36±3.03	1.73±5.22	0.0194
Thyroid-stimulating hormone (mIU/mL)	2.46±3.69	2.26±2.45	0.0806
Free T4 (ng/dL)	1.27±0.23	1.31±0.2	<0.0001
α-Fetoprotein (ng/mL)	2.95±1.82	3.05±2.09	0.1466
Carcinoembryonic antigen (ng/mL)	1.89±2.94	1.73±1.3	0.0541
Carbohydrate antigen 19-9 (U/mL)	7.98±8.68	9.13±26.87	0.1023
Cancer antigen 125 (U/mL)	13.23±13.97	14.64±21.01	0.1115
Prostate-specific antigen (ng/mL)	1.19±1.15	1.22±1.31	0.8056

Values are presented as mean±standard deviation. Calculated by paired t-test and generalized estimating equations after matching for age and sex.

(P<0.05). By contrast, high fasting glucose level, low HDL, and high TG were more prevalent among native Koreans (P<0.05). Tumor markers were not significantly different between the two groups (Tables 1, 2).

### 2. Prevalence of Gastrointestinal Diseases

Reflux esophagitis, colorectal polyp (only adenoma), and hemorrhoids were more prevalent among Korean Americans than among native Koreans (12.92% versus 10.08%, 37.69% versus 28.68%, 32.23 versus 29.96%; P<0.05). However, the prevalence of gastric ulcer was higher among native Koreans than among Korean Americans (5.53% versus 3.01%, P<0.05) (Table 3).

### 3. Prevalence of Other Diseases

No significant differences were observed in the prevalence of thyroid cancer, brain tumor, prostate cancer, lung cancer, chronic liver disease, hepatocellular carcinoma, renal cell carcinoma, pancreatic mass, adrenal mass, and CAD between Korean Americans and native Koreans (Table 4). However, the prevalence of prostate benign prostatic hyperplasia (BPH) was higher among Korean Americans than among native Koreans (30.21% versus 14.29%, P<0.0005). In addition, although not

**Table 3.** Prevalence of gastrointestinal disease in native Koreans and Korean Americans

Variable	Native Koreans	Korean Americans	P-value
Reflux esophagitis	144/1,428 (10.08)	193/1,494 (12.92)	0.0140
Gastric ulcer	79/1,428 (5.53)	45/1,494 (3.01)	0.0007
Duodenal ulcer	59/1,428 (4.13)	61/1,494 (4.08)	0.9474
Gastric cancer	3/1,428 (0.21)	1/1,494 (0.07)	0.3010
Colorectal polyps (adenoma in pathologic findings)	117/408 (28.68)	421/1,117 (37.69)	0.0471
Colorectal cancer	1/408 (0.25)	1/1,117 (0.09)	0.5505
Hemorrhoids	110/408 (29.96)	360/1,117 (32.23)	0.0422

Values are presented as number (%). Calculated by generalized estimating equations after matching for age and sex.

**Table 4.** Prevalence of other diseases in native Koreans and Korean Americans

Variable	Native Koreans	Korean Americans	P-value
Thyroid cancer	0/79 (0)	3/1,064 (0.28)	0.0828
Brain tumor	0/11 (0)	1/385 (0.26)	0.0729
Prostate cancer	0/77 (0)	3/513 (0.58)	0.0824
Benign prostatic hyperplasia	11/77 (14.29)	155/513 (30.21)	0.0004
Lung cancer	0/44 (0)	1/982 (0.10)	0.3171
Chronic liver disease	0/37 (0)	0/671 (0)	0.3169
Hepatocellular carcinoma	0/37 (0)	1/671 (0.15)	0.3996
Renal cell cancer	1/37 (2.70)	3/671 (0.45)	0.3996
Pancreatic mass (only cyst)	0/37 (0)	2/671 (0.30)	0.1567
Adrenal mass (only adenoma)	0/37 (0)	3/671 (0.45)	0.0826
Coronary artery disease	3/12 (25.00)	103/376 (27.39)	0.8021

Values are presented as number (%). Calculated by generalized estimating equations after matching for age and sex.

**Table 5.** Dietary pattern questionnaire of native Koreans and Korean Americans

Questionnaire	Native Koreans (n=272)	Korean Americans (n=173)	P-value
1. Three meals a day			0.4894
Yes	68 (60.71)	59 (52.68)	
Sometimes	23 (20.54)	27 (24.11)	
No	21 (18.75)	26 (23.21)	
2. Meals at the appointed time			0.2846
Yes	63 (56.76)	60 (54.05)	
Sometimes	28 (25.23)	38 (34.23)	
No	20 (18.02)	13 (11.71)	
3. Time for one meal			0.0122
Less than 15 min	54 (48.65)	37 (33.33)	
15 to 30 min	56 (50.45)	66 (59.46)	
More than 30 min	1 (0.90)	8 (7.21)	
4. Overeating			0.7746
Yes	15 (13.51)	18 (16.22)	
Sometimes	67 (60.36)	62 (55.86)	
No	29 (26.13)	31 (27.93)	
5. Eating out			0.3417
Yes	34 (31.48)	44 (40.74)	
Sometimes	64 (59.26)	57 (52.78)	
No	10 (9.26)	7 (6.48)	
6. Water drinking (6 to 8 cups/d)			0.4343
Yes	39 (35.14)	43 (38.74)	
Sometimes	52 (46.85)	43 (38.74)	
No	20 (18.02)	25 (22.52)	
7. Interest in nutrition			0.5491
Much	32 (29.36)	39 (35.78)	
Middle	61 (55.96)	54 (49.54)	
Less	16 (14.68)	16 (14.68)	
8. Grain			0.7827
1–2 times/d	75 (68.18)	78 (70.91)	
3 times/d	33 (30.00)	29 (26.36)	
4 times/d	2 (1.82)	3 (2.73)	
9. Protein			0.6294
1–2 times/d	90 (82.57)	95 (87.16)	
3 times/d	17 (15.60)	12 (11.01)	
4 times/d	2 (1.83)	2 (1.83)	
10. Vegetables			0.1429
Less than 1 time/d	52 (47.71)	61 (55.96)	
2 times/d	43 (39.45)	42 (38.53)	
3 times/d	14 (12.84)	6 (5.50)	
11. Vegetable oil			0.43
0 to 2 times/wk	63 (58.88)	59 (55.14)	
3 to 5 times/wk	39 (36.45)	38 (35.51)	
6 to 7 times/wk	5 (4.67)	10 (9.35)	
12. Fruits			0.4268
0 to 2 times/wk	42 (38.18)	34 (30.91)	
3 to 5 times/wk	49 (44.55)	51 (46.36)	
6 to 7 times/wk	19 (17.27)	25 (22.73)	
13. Milk and dairy products			0.9616
0 to 2 times/wk	71 (63.96)	69 (62.16)	
3 to 5 times/wk	29 (26.13)	30 (27.03)	
6 to 7 times/wk	11 (9.91)	12 (10.81)	
14. Sugary food			0.2219
0 to 2 times/wk	50 (45.05)	53 (47.75)	
3 to 5 times/wk	42 (37.84)	48 (43.24)	
6 to 7 times/wk	19 (17.12)	10 (9.01)	

(Continued to the next page)

**Table 5.** Continued

Questionnaire	Native Koreans (n=272)	Korean Americans (n=173)	P-value
15. Salty food			0.2219
0 to 2 times/wk	50 (45.05)	53 (47.75)	
3 to 5 times/wk	42 (37.84)	48 (43.24)	
6 to 7 times/wk	19 (17.12)	10 (9.01)	
16. Greasy food			0.0695
0 to 2 times/wk	94 (85.45)	82 (74.55)	
3 to 5 times/wk	15 (13.64)	28 (25.45)	
6 to 7 times/wk	1 (0.91)	0 (0)	
17. Egg yolk			0.1907
0 to 2 times/wk	88 (80.00)	77 (70.00)	
3 to 5 times/wk	21 (19.09)	30 (27.27)	
6 to 7 times/wk	1 (0.91)	3 (2.73)	
18. Coffee and infusions			0.0567
0 to 2 times/wk	37 (34.26)	52 (48.15)	
3 to 5 times/wk	40 (37.04)	24 (22.22)	
6 to 7 times/wk	31 (28.70)	32 (29.63)	
19. Hot and spicy seasoning			0.3154
0 to 2 times/wk	70 (66.04)	80 (75.47)	
3 to 5 times/wk	33 (31.13)	23 (21.70)	
6 to 7 times/wk	3 (2.83)	3 (2.83)	
20. Drinking			0.9048
0 to 2 times/wk	76 (85.39)	78 (87.64)	
3 to 5 times/wk	12 (13.48)	10 (11.24)	
6 to 7 times/wk	1 (1.12)	1 (1.12)	

Values are presented number (%). Calculated by paired t-test and generalized estimating equations after matching for age and sex.

statistically significant, >20% of participants in both groups had high CAD prevalence rate.

#### 4. Dietary Pattern Questionnaire

Table 5 shows a comparison of dietary pattern questionnaires used among Korean Americans and native Koreans. Among these, only “time for one meal” showed significance ( $P<0.05$ ). Native Koreans had a very short meal time of 15 minutes (48.7% versus 33.3%), whereas Korean Americans ate more slowly for 15–30 minutes (59.5% versus 50.5%) or >30 minutes (7.2% versus 0.9%).

## DISCUSSION

In this study, reflux esophagitis, colorectal polyp, hemorrhoids, and BPH were more prevalent among Korean Americans, whereas only gastric ulcer was more prevalent among native Koreans. However, both groups had high prevalence of CAD, although not statistically significant. Dietary patterns were not significant between the two groups. This is the first study to compare between the disease and dietary patterns among Korean Americans and native Koreans.

CAD is the leading cause of death worldwide.<sup>6)</sup> CAD rapidly develops in individuals living in developing countries or in those at the threshold of entry into developed countries owing to the rapid lifestyle changes such as Westernized eating habits because of industrialization and urbanization and reduced physical activity.<sup>6)</sup> In Korea, the in-

cidence of arteriosclerosis has been increasing; the mortality rate due to ischemic heart disease per 100,000 populations has nearly doubled, ranging from 13.3 in 1993 to 24.6 in 2003.<sup>7)</sup> In this study, approximately 27.39% of Korean Americans and 25% of native Koreans had CAD. However, existing risk factors and exercise stress test do not find the majority of patients at risk for CAD. CAD remains asymptomatic until symptom occurrence or stress tests are positive. Some patients diagnosed with CAD frequently showed negative results during exercise stress tests or other tests. Therefore, the detection and prediction of CAD without symptoms is very important. With coronary CT angiography, quantification of coronary artery calcium has been shown to be reliable, reproducible, and predictive of cardiovascular risk.<sup>8)</sup>

The prevalence of colorectal polyp is generally higher in the Western population than in the Asian population. The prevalence of colonic polyp in Western countries ranged from 29.4% to 58%, whereas that in Asian countries ranged from 16.3% to 18.5%.<sup>9)</sup> In contrast, Lam et al.,<sup>10)</sup> one of the first large studies to examine the use of colonoscopy in an Asian American population, suggested that the prevalence of advanced colorectal neoplasia among Asian Americans was similar to that among non-Asians. Approximately 37.69% of Korean Americans and 28.68% of native Koreans had colorectal polyps. This result is similar to that of a previous study, which reported that 34% of asymptomatic Asian American men and 21% of women had colorectal neoplasm.<sup>10)</sup> The following factors possibly contributed to the increased prevalence of colorectal polyps among Asian Americans. First, increased exposure to high-fat diet in Asian Americans may contribute to high prevalence of adenoma along with CRC risk.<sup>10)</sup> Second, Asian Americans have many critical barriers to receiving preventive health services in the United States. Previous studies found that Asian Americans have lower CRC screening rates than non-Hispanic white Americans.<sup>11)</sup> Moreover, Korean Americans have lower rates of CRC screening awareness and uptake.<sup>4)</sup> However, the low prevalence of colon polyps among native Koreans may partially account for periodic diagnostic colonoscopy or the removal of small polyps during screening. According to the recently published Korean guidelines for CRC screening and polyp detection, asymptomatic adults aged 45–80 years are recommended to undergo annual or biennial fecal immunochemical test. Selective colonoscopy is also recommended considering individual preference and CRC risk.<sup>12)</sup> Thus, Korean Americans should also follow these Korean guidelines. In our study, the incidence of gastric ulcer was significantly higher among native Koreans than among Korean Americans. A study by Kim et al.<sup>9)</sup> reported similar results, indicating that 3.4% of native Koreans and 2.8% of Korean Americans developed gastric ulcer. Further studies are needed to analyze risk factors between the two groups.

The prevalence of reflux esophagitis was lower in the Asian population than in the Western population; however, Korean studies have reported that the prevalence of reflux esophagitis ranged from 8% to 11.8%.<sup>13,14)</sup> Approximately 12.92% of Korean Americans and 10.08% of native Koreans had reflux esophagitis. Several risk factors of reflux esophagitis, such as hiatal hernia, male sex, obesity, and alcohol con-

sumption, have been reported.<sup>14,15)</sup> However, none of the items examined were considered as risk factors of reflux esophagitis. Hence, further studies are needed to evaluate risk factors of reflux esophagitis among Korean Americans.

Hemorrhoid is the most common anal disease in the Korean adult population.<sup>16)</sup> A Korean study reported that the prevalence of hemorrhoids diagnosed by physicians was 7.2%.<sup>16)</sup> Another study reported that the prevalence of hemorrhoids ranged from 4.4% to 86%.<sup>17,18)</sup> In this study, the prevalence of hemorrhoids was higher among Korean Americans than among native Koreans. Several factors have been suggested to contribute to the occurrence of hemorrhoids in Koreans, such as obesity, abdominal obesity, depression, and past pregnancy.<sup>16)</sup> In women, self-reported hemorrhoids were more prevalent in those with less fiber intake.<sup>16)</sup> In this study, the proportion of people eating vegetables less than once a day was higher among Korean Americans than among native Koreans, and the rate of eating more than three times a day was higher among native Koreans than among Korean Americans. This can be due to the higher prevalence of hemorrhoids among Korean Americans than among native Koreans. Hence, preventive education should be implemented to Korean Americans, noting that vegetable intake is an important factor associated with hemorrhoids.

BPH is one of the most common conditions in aging men and often presents as lower urinary tract symptoms related to voiding problems and bladder irritability.<sup>19)</sup> Although no accurate Korean statistics exist on the prevalence of BPH, the prevalence of prostate hyperplasia in men aged over 40 years who underwent general health checkups was 25.9%.<sup>20)</sup> In addition, the prevalence of prostate hypertrophy markedly increases with age. Moreover, the prevalence of BPH was higher among Korean Americans than among native Koreans (30.21% versus 14.29%). Metabolic syndrome, such as obesity and diabetes, is a well-known causative agent of BPH.<sup>21,22)</sup> In contrast, increased physical activity and exercise have been associated with decreased risks of BPH.<sup>23)</sup> With regard to nutrition, excessive intake of total energy, total protein, red meat, fat, milk and dairy products, cereals, bread, poultry, and starch potentially increases the risk of BPH, whereas intake of vegetables, fruits, polyunsaturated fatty acids, linoleic acid and vitamin D, vitamin E, lycopene, selenium, and carotene potentially decreases risk of BPH.<sup>24)</sup> However, in our study, although the prevalence of BPH among Korean Americans was extremely higher than that among native Koreans, none of these risk factors were present.

Diet is one of several changes occurring as a result of immigration and can have a great impact on disease prevalence. Dietary changes, including increased intakes of total energy and fat, that are observed in Asian Americans have been hypothesized as risk factors for various chronic diseases.<sup>25)</sup> Therefore, the study on the relationship between dietary patterns and disease prevalence of native Koreans and Korean Americans may provide important information to prevent disease. One study reported that compared with native Korean women, US-born Korean American women were more likely to be overweight or obese and had higher intake of energy from fat and lower intake of

fruits and vegetables.<sup>26)</sup> Moreover, US-born women consumed less sodium than did Korea-born women.<sup>26)</sup> In another study, calcium intake of Korean Americans was low, particularly for elderly people.<sup>27)</sup> However, no significant differences were observed among the 20-item dietary pattern questionnaire in this study.

We do acknowledge that this study has limitations. First, the sample of both groups is not representative of all native Koreans and Korean Americans because this is a cross-sectional study conducted in a single health promotion center and is not a random sample in Korean Americans. This may have been a source of selection bias. To make up for this selection bias, age- and sex-matched native Koreans and Korean Americans were selected. However, Korean Americans who came to Korea from the United States and underwent a health checkup were more aware of health-related symptoms than native Koreans. Hence, this selection bias will not be resolved through age-sex matching. In addition, regarding the rare and common diseases, measuring the prevalence rate to approximately 1,000 could lead to serious bias. Second, patients' length of residency in the United States was not obtained, and immigrants were not distinguished by generation. Park et al.<sup>26)</sup> reported that health-related behaviors and intakes of nutrients and foods in Korean Americans were affected by their place of birth, but not by their parents' place of birth. Compared to Korea-born women, US-born women were more likely to use preventive medical services and showed more Westernized dietary characteristics.<sup>26)</sup> Third, as items in the dietary questionnaire are labeled as ingredients instead of food, people may have difficulty in understanding. However, differences between commercial foods in the United States and in Korea may be large. Additionally, the lack of subdivision of the items can also be considered as a limitation. The greatest limitation is the small number of samples selected to answer the dietary questionnaire.

In conclusion, this study showed that the prevalence of several diseases among Korean Americans differed from that among native Koreans. This result can predict the future burden of disease among Korean Americans. Further studies that overcome the limitations in this study are needed and may play a major role in recommending a screening and surveillance strategy for Korean Americans in the future.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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