Pilot Study: International Comparative Research

Comparison of Body Composition, Handgrip Strength, Functional Capacity, and Physical Activity in Elderly Koreans and Korean Immigrants

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ABSTRACT

Immigration to a foreign country has a significant impact on a person’s health status and health management behavior. The purpose of this pilot study was to examine body composition (body mass index and muscle area of the mid-upper arm and mid-calf), handgrip strength, functional capacity, and physical activity in elderly Koreans and Korean immigrants. In this cross-sectional study, a convenience sample of 87 elderly Korean immigrants and 294 elderly Koreans were recruited from senior centers and senior apartments in the United States and Korea. Compared with elderly Koreans, elderly Korean immigrants had higher mid-calf muscle area ($p = 0.06$), handgrip strength ($p = 0.01$), and functional capacity ($p = 0.01$) and less physical activity ($p < 0.01$). Older men were more physically active and had more muscle areas, greater handgrip strength, and better functional capacity than older women, whereas older women had higher BMI scores than older men. This study provides motives for the development of health promotion intervention studies (e.g., culturally relevant exercise programs incorporating strength training). Future studies could identify culturally relevant strategies to promote physical activity in elderly Korean immigrants and especially elderly Korean women in both groups.

Racial and ethnic minorities have lower levels of leisure-time physical activity than do Caucasian individuals (American Heart Association, 2008; He & Baker, 2005). For example, Korean Americans, one of the fastest growing subgroups in the United States (U.S. Census Bureau, 2001), were found to have low levels of physical activity (Kim, Juon, Hill, Post, & Kim, 2001). Changed personal environments as a result of immigration (e.g., lack of support system, language barriers, lack of cultural opportunity to exercise, a feeling of inappropriateness) might be one of the factors influencing physical inactivity among elderly Korean immigrants (Sin, LoGerfo, Belza, & Cunningham, 2004).

Elderly Koreans (age 60 and older) in Korea accounted for 13% of the total population in 2005 (Korean Statistical
Information Services, 2006). Currently, many Koreans are self-conscious about physical and psychological well-being due to Korea’s national efforts to promote health. As a result, more elderly Koreans are engaged in physically active lifestyles than before (Lim, Kayser-Jones, Waters, & Yoo, 2007). However, a major barrier identified for physical activity among elderly Koreans includes socioeconomic status (e.g., low income and educational level) (Heo & Cho, 2008).

Physical changes associated with aging in community-dwelling older adults are diverse and are influenced by sociocultural environments and lifestyle (Wada et al., 2005). For example, changes in body composition and muscle quality with increasing age are due to a variety of factors, such as environment, physical activity, and disease (Ferreira, Lerario, Gimeno, Sanudo, & Franco, 2002; Guo, Zeller, Chumlea, & Siervogel, 1999). Also, exposure to an unfavorable environment (e.g., Western dietary pattern, sedentary lifestyle) resulted in a number of metabolic disturbances, such as weight gain and abnormal fat deposition, in Japanese immigrants (Ferreira et al., 2002).

For older adults, maintenance of muscle mass and strength at a certain level is critical to prolong their functional independence and normal daily activities. Participation in regular physical activity over the course of the life span has a powerful influence on the rate of physical aging by slowing or minimizing many aging-related problems (Morey, Pieper, Crowley, Sullivan, & Puglisi, 2002). Several studies (Binder et al., 2002; Gill et al., 2002; Puggaard, 2003) suggest that physical activity significantly improves muscle endurance, balance, and muscle strength; further prevents functional decline; and improves disability in older adults.

BACKGROUND

Despite the proven benefits of regular physical activity, physical inactivity is a prevalent health risk among older adults in the United States (Centers for Disease Control and Prevention [CDC], n.d.). Approximately one in three men and one in two women engage in no physical activity by age 75 (CDC, n.d.). Physical inactivity is especially common among elderly immigrants (Kim et al., 2001; Koya & Egede, 2007). Therefore, the purposes of this pilot study were to: (a) examine the differences in body composition, handgrip strength, functional capacity, and physical activity between elderly Koreans and elderly Korean immigrants, and (b) examine the relationships between these variables in elderly Koreans and elderly Koreans immigrants. To our knowledge, this is the first published study that compares these variable among elderly Koreans and elderly Korean immigrants.

Anthropometric Measures

Anthropometric measures, such as body mass index (BMI) (from weight and height), muscle area of the mid-upper arm and mid-calf (from skinfold thickness and circumference), and handgrip strength, are common, noninvasive indicators to predict individuals’ health (Lauretani et al., 2003; Mehta et al., 2007; Woo, Leung, & Kwok, 2007). The American College of Sports Medicine has included muscular fitness in its position paper (Mazzeo et al., 1998) on the quantity and quality of exercise to achieve and maintain fitness. Grip strength was significantly related to physical functioning (Bautmans, Gorus, Njemini, & Mets, 2007).

Ecological Model of Health Promotion

The model guiding this study is the Ecological Model of Health Promotion, which understands health to be determined by a complex interplay of environment and the individual (McLeroy, Bibeau, Steckler, & Glanz, 1988). The environmental level includes institutions, community, and policy. Living in a foreign country with a different personal environment (e.g., Western culture, living conditions, socioeconomic status, language, social networks, family structure and function), exposure to different lifestyles (e.g., a higher fat diet, sedentary lifestyle), limited access to health care systems due to language barriers, and lack of knowledge about the American health care system may differentiate health status and health management behaviors of elderly Korean immigrants and elderly Koreans. For example, elderly Koreans living in the United States may not be as physically active as those in Korea because of a sedentary living environment. For example, the majority of daily life activities (e.g., grocery shopping, errands) requires an automobile or public transportation in the United States but in Korea can be done by walking. In addition, the majority of health promotion programs (DeVito, Morgan, Duque, Abdel-Moty, & Virnig, 2003; Holland, Greenberg, Tidwell, & Newcomer, 2003) in the United States have been developed primarily within the context of the majority population of Caucasian people of European descent.

Different environments and levels of physical activity result in differences in body composition, handgrip strength, and functional capacity in elderly Korean immigrants and elderly Koreans. The findings from this study provide ideas and baseline data for designing future interventional studies.
METHOD

A cross-sectional design was used for this study to examine body composition (BMI, muscle area of the mid-upper arm and mid-calf), handgrip strength, functional capacity, and physical activity in elderly Korean immigrants and elderly Koreans. This study was approved by the participating university’s Human Subjects Review Committee. Agreement for data collection was received from each of the two partnering institutions in the United States and Korea. Informed consent (written in Korean) was obtained from all study participants.

Sample and Data Collection

Senior centers in both Korea and the United States are community focii for elders’ social gatherings. The majority of elderly Koreans in both countries who are physically able to commute go to senior centers for lunch and social gatherings, regardless of their religion and location of residence. A convenience sample of 87 elderly Korean immigrants was recruited from four Korean senior centers and three senior apartments in King County, Snohomish County, and Pierce County in the state of Washington. The first author (M.-K.S.), a faculty member at a U.S. university, met with the managers of the senior centers before data collection and received permission to conduct the study in the senior centers/apartments. Data were collected from April to May 2005 by the first author and a trained research assistant. The number of participants recruited was limited because of the limited funding available in the United States.

In Korea, 294 elderly Koreans were recruited from senior centers in Seoul and Kangwon province. The research team in Korea (who are faculty members at Korean universities) obtained cooperation from the directors of the senior centers. Data in Korea were collected from June to July 2004 by trained research assistants.

Data collection in Korea and the United States was not done concurrently because of separate grant funding. Within each country, the same trained research assistants were assigned to obtain designated physical measures throughout the data collection period to reduce measurement errors in both groups. Inclusion criteria for participants in both the United States and Korea were an age of 65 or older and a Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975) score of 23 or higher.

Variables

Variables measured in this study included body composition, handgrip strength, functional capacity, and physical activity.

Body Composition. Body composition was evaluated using BMI and muscle area. BMI was calculated from height and weight measurements. Body weight was measured in kilograms using an electronic stand-up scale in both the United States (BF-682W, Tanita, Arlington Heights, Illinois) and Korea (DS-102, Dong-San Jenics, Korea). All participants in the United States and Korea were asked to remove their shoes, coats, and any heavy clothes before standing on the scale. Calibration of the scale was done with a standard 1-kg weight three times before beginning. In the United States, height was measured with a tape ruler posted on the wall; in Korea, with a portable stadiometer (a height-measuring device that typically consists of a vertical ruler with a sliding horizontal rod or paddle which is adjusted to rest on the top of the head) (Dong-San Jenics). In both countries, participants were asked to remove their shoes and place their back against the wall. BMI was calculated by the formula: $\text{BMI} = \frac{\text{weight (kg)}}{\text{height (m)}^2}$ (Jarvis, 2004).

Muscle areas were obtained from the measurements of extremity (mid-upper arm and mid-calf) circumference and skinfold thickness. Skinfold thickness on the mid-upper arm and mid-calf was measured with a skinfold caliper (Lange Skinfold Caliper, Beta Technology, Inc., Santa Cruz, California). For each skinfold thickness, the mean of two trials was taken as the final measurement. Circumference of the extremities was measured in centimeters with a tape ruler. Mid-upper arm circumference was measured at the mid-point between the olecranon and acromion processes, and mid-calf circumference from the most protruding (bulging) posterior area when the knee is extended. Once extremity circumference and skinfold thickness values were obtained, muscle areas were calculated with the formula: $\text{mid-arm muscle areas (cm}^2\) = (mid-upper arm circumference [MAC] [cm] – mid-upper arm muscle circumference [MAMC] [cm] $^2$/4 $\pi$), where $\text{MAMC} = \text{MAC} – (\pi \times \text{triceps skinfold [mm]})$ (Jarvis, 2004).

Handgrip Strength. Handgrip strength, a measure of strength of the hand and the forearm muscles, is a useful index of overall musculoskeletal condition. Handgrip strength was measured with a hand dynamometer (J00105 Jamar hydraulic hand dynamometer, Lafayette Instrument Company, Lafayette, Indiana, in the United States; TKK 5101, Takei Corp, Tokyo, Japan, in Korea). While sitting, participants were instructed to exert their maximum grip. The mean of two trials was used in this study. Grip strength was expressed in kilograms.

Variables

Variables measured in this study included body composition, handgrip strength, functional capacity, and physical activity.
Functional Capacity. Functional capacity was measured with the Tokyo Metropolitan Institute of Gerontology (TMIG) Index of Competence (Koyano, Shibata, Nakazato, Haga, & Suyama, 1991), which uses a multidimensional 13-item binary (yes/no) response format. The TMIG Index of Competence consists of three subscales:

- Instrumental self-maintenance (e.g., ability to use public transportation, buy daily necessities, prepare meals, pay bills, handle banking matters).
- Intellectual activity (e.g., ability to fill out forms, read newspapers, books, or magazines).
- Social roles (e.g., ability to visit friends, give advice to relatives and friends who confide in them, visit someone at a hospital, initiate conversation with younger people).

Higher scores indicate better functional capacity. Internal consistency and construct validity of the TMIG Index of Competence have been demonstrated using community-dwelling Japanese older adults (Koyano et al., 1991). The TMIG Index of Competence was tested for reliability (Cronbach’s alpha coefficient = 0.92) in Korean older adults (Lee & Shinkai, 2005).

Physical Activity. Physical activity was measured with a Korean version of the Physical Activity Scale for the Elderly (PASE) (Washburn, Smith, Jette, & Janney, 1993). The Korean translation was performed by the Korean research team members. Test-retest reliability of the Korean PASE, measured with older adults in a pilot study by the research team in Korea, was 0.94.

The PASE is a 12-item measure that asks about leisure activities, work, and home-related activities. Activities are recorded as occurring never, seldom (1 to 2 days per week), sometimes (3 to 4 days per week), and often (5 to 7 days per week). Duration is categorized as less than 1 hour, between 1 and 2 hours, 2 to 4 hours, or more than 4 hours. Paid or unpaid work, other than work that involves mostly sitting activity, is recorded in total hours per week. Housework (light and heavy), lawn work/yard care, home repair, outdoor gardening, and caring for others are recorded as yes or no. The total PASE score (ranging from 0 to 400) was computed by multiplying the amount of time spent in each activity (hours per week) or participation in an activity (yes or no) by the empirically derived item weights and summing overall activities. The PASE showed construct validity (Washburn & Ficker, 1999; Washburn et al., 1993), and test-retest reliability of the PASE ranged from 0.75 to 0.84 (Washburn et al., 1993).

Data Analysis

All statistical analyses were performed using SPSS, version 15.0. The level of significance was set at 0.05 in a two-sided analysis. Descriptive statistics were performed initially to describe distribution of the participant characteristics. Comparisons of body composition, handgrip strength, functional capacity, and physical activity between elderly Korean immigrants and elderly Koreans were made using independent t tests to determine any differences in the variables between the groups. Pearson’s product-moment correlational analyses were used to detect associations among the variables and multiple regressions to determine predictive effects of the demographic characteristics (e.g., age, gender, marital status) on the variables.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Characteristics of the Sample</th>
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<tbody>
<tr>
<td></td>
<td>Elderly Korean Immigrants (n = 87)</td>
</tr>
<tr>
<td>Variable</td>
<td>Men (n = 49)</td>
</tr>
<tr>
<td>Mean age (SD)</td>
<td>78 (6.58)</td>
</tr>
<tr>
<td>Years living in the United States (SD, range)</td>
<td>17 (7.9, 1 to 35)</td>
</tr>
<tr>
<td>Married</td>
<td>n = 37 (75.5%)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>n = 21 (42.9%)</td>
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<tr>
<td>High school</td>
<td>n = 11 (22.4%)</td>
</tr>
<tr>
<td>More than high school</td>
<td>n = 17 (34.7%)</td>
</tr>
</tbody>
</table>
demographic Characteristics

Participants included 87 elderly Korean immigrants and 294 elderly Koreans. As shown in Table 1, significant differences were found in mean age and education. The mean age of elderly Korean immigrants and elderly Koreans was 74.1 (SD = 4.77, age range = 65 to 84) and 72.7 (SD = 4.77, age range = 65 to 84), respectively. Women comprised 44% (n = 38) of the elderly Korean immigrant group and 65% (n = 192) of the elderly Korean group. The percentage of married participants was consistent, with 61% of elderly Korean immigrants (n = 53) and 60% of elderly Koreans (n = 177). Elderly Korean immigrants had higher levels of education, with 49% having high school or higher level diplomas, as compared with 24% of elderly Koreans.

Comparison of the Variables

Independent tests showed significant group differences for the variables, such as muscle areas of the mid-upper arm (t = 4.65, p < 0.01) and mid-calf (t = 2.79, p = 0.06) muscle areas, mean handgrip strength (26.4 kg versus 23.8 kg), and mean functional capacity scores (9.9 versus 9.7). Elderly Korean immigrants had higher mean muscle areas (49.5 versus 41.1 cm²) and handgrip strength (26.4 kg versus 23.8 kg) than elderly Koreans. Elderly Korean immigrants had significantly higher mean mid-calf muscle areas (80.1 cm² versus 73.8 cm²) and higher mean functional capacity scores (10.7 versus 9.9). No statistically significant group difference between elderly Korean immigrants and elderly Koreans was found for BMI (t = 1.18, p = 0.24).

In multiple regression analysis, age and gender had independent predictive effects on BMI, mid-calf muscle areas (r = 0.15, p = 0.01), and arm muscle area (r = 0.13, p = 0.01). Older men and women had higher BMI scores than older women, whereas older women had higher BMI scores than older men. Younger age was significantly correlated with lower scores in handgrip strength (r = -0.22, p < 0.001), mid-calf muscle areas (r = -0.13, p < 0.001), and arm muscle area (r = -0.15, p < 0.01). Older men were more physically active and had more muscle areas, greater handgrip strength, and better functional capacity scores than older women, where-
Correlations of the Variables

Pearson’s product-moment correlation analysis showed that muscle areas, handgrip strength, and functional capacity had significant correlations with physical activity scores in elderly Koreans \((p < 0.01)\), but not in elderly Korean immigrants. Functional capacity was significantly correlated with physical activity in immigrant women and mid-upper arm muscle area in immigrant men. Functional capacity, handgrip strength, and muscle areas had significant correlations with physical activity in older Korean men. Functional capacity and mid-upper arm muscle area were significantly correlated with physical activity in older Korean women (Table 3).

DISCUSSION

Physical status of elderly Korean immigrants and elderly Koreans differed in this study: Elderly Korean immigrants had larger muscle areas of the mid-calf, stronger handgrip, and better functional capacity than elderly Koreans, whereas elderly Koreans were more physically active than elderly Korean immigrants. Older participants in both countries had lower calf and arm muscle areas than younger participants, probably due to less physical activity and the aging process. Not surprisingly, older men had stronger handgrip than women. Reasons for differences on muscle areas of the mid-upper arm and mid-calf between elderly Korean immigrants and elderly Koreans are not clear. More detailed assessments on physical activity patterns might help to understand the differences.

Elderly Korean immigrants had better functional capacity, despite elderly Koreans having greater physical activity levels. Functional capacity was measured with the TMIG Index of Competence, which included intellectual ability (e.g., reading newspapers, books, or magazines) and social roles (e.g., giving advice to relatives and friends, initiating conversations with younger people). As was true for our samples, people who immigrate to the United States tend to have higher education levels (Noland, n.d.). The different personal characteristics between the two groups may have contributed to the difference in functional capacity.

Contrary to other study findings on higher physical activity level and lower BMI (Di Francesco et al., 2005; Kyle, Genton, Gremion, Slosman, & Pichard, 2004) and the significant group difference in physical activity in this study, no difference was found for BMI between elderly Koreans and elderly Korean immigrants. Although no statistically significant difference was found for BMI, the mean BMI scores of elderly Korean immigrants were clinically significant (25.4), categorizing these individuals as overweight. Elderly women had higher mean BMI scores than men in both countries (26.4 versus 24.6). Women accounted for a smaller proportion of elderly Korean immigrants (44%), compared with 65% of elderly Koreans.

Goel, McCarthy, Phillips, and Wee (2004), Singh and Siahpush (2002), and Song et al. (2004) reported a positive association among more years of living in the United States, obesity, and BMI in various ethnic immigrants. Dietary patterns, as well as physical activity, significantly influence BMI. A traditional Korean diet is based on rice and vegetables with only rare consumption of saturated fats. In addition, meats are expensive in Korea. Although elderly Koreans who immigrated to the United States after middle age may have already established dietary patterns, they might still adopt an American diet due to convenience. In this study, mean time living in the United States among the elderly Korean immigrant participants was 17 years (range = 1 to 35 years), which could be enough time for them to be exposed to and adopt some American ways.

![Table 3](https://example.com/table3.png)

**Table 3**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Physical Activity of Elderly Korean Immigrants</th>
<th>Physical Activity of Elderly Koreans</th>
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<tbody>
<tr>
<td></td>
<td>Men ((n = 49))</td>
<td>Women ((n = 38))</td>
</tr>
<tr>
<td>Body mass index</td>
<td>(-0.03 (0.83))</td>
<td>(-0.28 (0.09))</td>
</tr>
<tr>
<td>Mid-calf muscle area</td>
<td>(0.27 (0.05))</td>
<td>(-0.04 (0.81))</td>
</tr>
<tr>
<td>Mid-arm muscle area</td>
<td>(0.38 (&lt;0.01))</td>
<td>(-0.10 (0.54))</td>
</tr>
<tr>
<td>Handgrip strength</td>
<td>(0.14 (0.35))</td>
<td>(0.02 (0.92))</td>
</tr>
<tr>
<td>Functional capacity</td>
<td>(-0.01 (0.99))</td>
<td>(0.34 (0.04))</td>
</tr>
</tbody>
</table>
Because diet is a critical determinant of overweight status, specific information on the dietary pattern of elderly Korean immigrants is needed to plan appropriate culturally relevant health promotion interventions.

This study indicated that elderly Koreans were significantly more physically active than elderly Korean immigrants, despite elderly Korean immigrants being significantly younger. The Ecological Model of Health Promotion might explain the differences. Living environment has a significant relationship with one's lifestyle. In Korea, the majority of daily activities can be completed without transportation, which can contribute to the higher physical activity scores in elderly Koreans, as supported by the high presence of lifestyle physical activity in Korea (Lim et al., 2007). In addition, many health promotion programs designed for older adults in the United States are not known among elderly Korean immigrants because the programs are not advertised in Korean (Sin, Belza, LoGerfo, & Cunningham, 2005). Even if elderly Korean immigrants were aware of the programs, they might not participate if the contents are taught in English.

Gender and age were independent predictors of physical activity. Older men had significantly higher physical activity scores than women in both groups. Considering higher numbers of men in elderly Korean immigrants (56%), they were less physically active than the elderly Korean men.

Many elderly Korean immigrants have grown up believing retirement is time to rest and that physical activity and exercise is for youth (Sin et al., 2005). Health promotion, such as exercise and physical activity, was not a popular concept in this generation, especially for elderly Korean women. Expected social roles for women of this generation included taking care of family members and cooking at home (Sin et al., 2004). Today, many Koreans in Korea are very aware of personal health and spend time and money for their own health promotion. Older Korean immigrants who are isolated in the Korean community with less exposure to the main American culture due to language barriers might keep old traditional thinking on health management (e.g., women need to be brave to exercise) (Sin et al., 2004). Health care providers need to encourage minority women to incorporate physical activity in their lives. Culturally relevant community-based exercise programs might greatly benefit women from ethnic minorities.

In general, and in this study, people become less physically active as they get older. According to the compression of morbidity theory (Fries, 1997), regular participation in physical activity is one of the strategies leading to a long life with a relatively short period of illness. Encouraging and developing age-appropriate physical activity programs are one way to promote active lifestyles in older people.

Correlations of the Variables

Muscle areas and handgrip strength had significant relationships with physical activity among elderly Koreans, as reported in other studies (Ryan, Nicklas, Berman, & Dennis, 2000; Senden et al., 2005). Both BMI and handgrip strength had significant relationships with muscle areas of the mid-upper arm and mid-calf ($p < 0.01$ in elderly Korean immigrants and elderly Koreans). Handgrip strength and muscle area have been used as indicators of overall muscle strength and have been shown to predict functional limitations in old age (Lebrun, van der Schouw, de Jong, Grobbee, & Lamberts, 2006; Rantanen et al., 1999; Sowers et al., 2005). With increasing age, a rapid decline has been observed in handgrip strength after age 60, by as much as 20% from peak levels (Rantanen et al., 1998).

Functional capacity had a significant relationship with physical activity in older women of both groups. Muscle areas had a significant relationship with physical activity in older men of both groups. Detailed assessment of gender differences on exercise pattern was not performed in this study. Preferences for kind of exercise and exercise program differ by gender (Wood, 2002). According to Bajwa and Rogers (2007), more women prefer good music and fun exercise when exercising than do men. Incorporating the needs of elderly Korean immigrants in an exercise program might be useful to motivate older adults to be more physically active.

Maintaining muscle mass and strength are critical to maintaining functional independence and daily activities in older adults. Physical activity and disease are influential factors for muscle mass and strength (Ferreira et al., 2002; Guo et al., 1999). Park et al. (2006) found greater declines in muscle mass and strength in older adults with type 2 diabetes than those without diabetes: For example, older adults with type 2 diabetes showed 50% more rapid decline in knee extensor strength and muscle mass in 3 years compared with those without diabetes. Considering increasing health disparities (e.g., cardiovascular disease risk factors) in minorities and increasing numbers of immigrants to the United States (Paeratakul, Lovejoy, Ryan, & Bray, 2002), controlling for the risk factors might have beneficial effects on improving muscle function and cardiovascular health in old age.

IMPLICATIONS

This pilot study, which compared body composition, handgrip strength, functional capacity, and physical ac-
tivity crossculturally between elderly Korean immigrants and elderly Koreans and assessed the relationships among those variables, has implications for research and practice. Maintaining and delaying muscle loss in older adults are important for better health outcomes. The link between muscle loss and disability with aging highlights the need for the development of more effective intervention studies to prevent or at least partially reverse muscle loss in older adults. Further studies on disease (e.g., diabetes) and muscle function, as well as gender differences on exercise preference, might be useful to motivate older adults to be more physically active.

This study provides useful implications for health care providers working in the field of health promotion for older adults. Elderly Korean immigrants were significantly less physically active than elderly Koreans. Women in both groups had lower physical activity levels than men. Elderly immigrants are excluded from many research studies, as well as many publicly available exercise programs, because of language barriers, cultural differences, lack of transportation, and hesitance toward their participation in research studies. Immigration itself can be a significant risk factor for good health outcomes in older adults. In some cultures, health promoting behaviors are not a popular concept. People may not seek care until symptoms develop, which is true of this generation's elderly Koreans. Encouraging and promoting healthy behaviors are critical for good health outcomes in elderly Korean immigrants. More culturally relevant attention (e.g., education on health issues and healthy lifestyles, accessible and affordable exercise programs) to elderly immigrants are needed to improve their health.

LIMITATIONS

The limitations of this study included a small sample in the United States due to limited funding for the U.S. arm of the study. The use of a convenience sampling method resulted in disproportionate numbers of men and women and personal characteristics (e.g., levels of education) between the two groups. Use of a probability sampling method in studies involving immigrants may be a challenge because of the limited sampling pool. Generalizability of the findings from the use of a convenience sample is limited to elderly Koreans with characteristics similar to those of the participants. The data may have been influenced by the use of different measuring protocols and instruments in the United States and Korea, leading to differences in results related to the form of measurement, not actual differences. For example, in the United States, height was measured with a tape ruler posted on the wall, and in Korea, with a stadiometer. Body weight and handgrip strength were measured with instruments from different companies. Other than these two examples, similar data collection protocols were used in the United States and Korea.

CONCLUSION AND RECOMMENDATIONS

The intent of this study was to compare body composition, handgrip strength, functional capacity, and physical activity in elderly Korean immigrants and elderly Koreans and to identify the relationships among these variables. Although significant differences were found in some of the variables between elderly Korean immigrants and elderly Koreans, more research is needed to determine the causes. Changes in sociocultural environment due to immigration might have influenced the differences in some of the variables (i.e., physical activity, muscle areas, handgrip strength, functional capacity) between elderly Korean immigrants and elderly Koreans.

Encouraging physical activity and developing effective exercise programs to delay muscle loss in older adults are some strategies to maintain and improve physical health status related to aging. The study findings provide future study ideas (e.g., culturally relevant strategies to promote physical activity in elderly Korean immigrants, especially older Korean women, assessment of dietary patterns in elderly Korean immigrants, gender differences in exercise preference, relationship between disease and muscle function) and motives for the development of health promotion intervention studies (e.g., culturally relevant exercise programs incorporating strength training).

REFERENCES


