Research Article

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The Prevalence and Determinants of Physical Activity among Korean Older Adults and Its Implications for Public Health

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Abstract

To determine the prevalence and determinants of physical activity in older Koreans, we assessed KNHANES-V, a cross-sectional and nationally representative survey conducted by the Korean Ministry of Health and Welfare. We also compared population estimates based on age, gender and major chronic conditions that the elderly frequently reported. In the data from KNHANES-V, 1964 out of 6193 were aged 60 and older. Being physically active was defined as participating in moderate physical activity for at least 30 minutes, 5 days a week or in vigorous physical activity for at least 20 minutes, 3 days a week. 70.6% older adults are never physically active; 36.4% of seniors walk daily (defined as 30 minutes a day, at least 5 days per week). Only 12.5% of older adults are as physically active as the American College of Sports Medicine (ACSM) recommended. There was a significant gender difference in ACSM's recommended Physical Activity (PA) (Chi-square F=21.22, p<.0001), moderate PA (Chi-square=3.57, p<.05), vigorous PA (Chi-square=24.02, p<.001), and recommended walking (Chi-square=24.13, p<.001). In vigorous activity, age and education were significant factors that affected males (p<.05) but not females (p<.05). In moderate activity, education was significant influence for male only. In walking, education (p<.001) and perceived health (p<.05) were influenced in men, but age (p<.01) and perceived health (p<.05) were influenced in women. In general, PA participation was affected by age (OR: 0.94, 95% CI: 0.88-1.00), perceived health (OR: 2.30, 95%CI: 1.39-3.80), and limited activity (OR: 3.96, 95% CI: 1.21-12.94) in males, yet, none of these factors affected PA participation in females. In conclusion, to promote physical activity participation in the older Korean population, different strategies should be introduced according to gender.

Keywords: Physical activity; Prevalence; Factors; Older adults

Introduction

Korea experience two waves of baby booms with the first-wave boomers born between 1955 and 1963 before the start of family planning policies. This age group ranged from 47 to 55 in 2010, representing about 7.2% million people, or about 14% of the total population Korea became great aware of these baby boomers in 2010, due in large part to the prospect that there will soon be a massive retirement of baby boomers from the labor market. In Korea, retirement generally begins as early as 55 and economic activities tend to decline from age 60. While approximately 30% of the elderly aged 65 or older participate in economic activities, which is higher than those in developed countries, most of them are self-employed, farmers or unskilled workers in work places that do not have a retirement age. Most of the time, retirement around age 55 is involuntary, rather than voluntary. Therefore the beginning of retirement by the enormous demographic pool of baby boomers raises concerns that they might impose increase burden on society.

Baby boomers will begin to enter old age (aged 65 or older) in 2020, and by 2030, the entire first generation of baby boomers will have entered old age. The ratio of senior population is expected to reach 15.6% by 2020, with the percentage of seniors age 80 or older growing to 3.6%. The ratio is likely to rise to 24.3% by 2030, with the percentage of seniors aged 80 or older reaching 5.3%. Moreover, the old-age dependency ratio is expected to grow from 15.0% today to 21.7% by 2020 and to 37.7% by 2030.

The proportion of health care expenses spent by the elderly exceeded 30% of the national insurance benefit expenditures in 2015. This seems quite high since the elderly only make up 11% of the population, the numbers are not that high, considering the high health care cost spent as people near death and the high incidence of chronic illnesses among the elderly [1].

The rapid rise in health care costs is a major social issue in Korea since many baby boomers are about to enter old age. A study shows that if healthcare costs continue to rise as they have been the past 10 years, by 2050, the overall cost of healthcare will be approximately 12 times bigger than in 2010 One of the most dismal scenarios on future health insurance and long-term care spending forecast that if health care costs continue to be spent as they have been past 10 years, the overall spending will become approximately 12 times bigger by 2050 than in 2010 [2,3].

The WHO has emphasized the value of physical activity as follows: "Physical activity is the single most useful thing that individuals can maintain their health and function and quality of life" (World Health Organization 1997). Older people gain benefits from regular physical activity participation such as lowered fracture risk, improved cardiovascular health, functional status, and mental sustainability [4-6].

One of the key challenges of public health professionals is examining the relevant prevalence and determinants of physical activity participation in this special cohort. However, a few population studies examined this issue in Korea. Therefore, the purpose of this study is to examine the current prevalence of physical activity participation in older Koreans and to provide evidence to have special

attention brought to the implementation and dissemination for older population.

Methods

Study design

One of the key challenges of public health professionals is examining the relevant prevalence and determinants of physical activity participation in this special cohort. However, a few population studies examined this issue in Korea. Therefore, the purpose of this study is to examine the current prevalence of physical activity participation in older Koreans and to provide evidence to have special attention brought to the implementation and dissemination for older population.

Study subjects

A total of 3,840 households were surveyed, selected from 192 survey locations. The overall participation rate was 82.8%. All participants provided written informed consent for both the participation in the survey and the use of the data for research purposes.

Participants completed a health interview, health behavior survey, nutritional survey, and medical examination. A health interview includes demographic characteristics (age, income, education, occupation, marital status, current smoking). In KNHANES V-1 (January-December, 2010), there were 1,964 participants aged ≥ 60 years.

Information regarding gender, age, marital status, education, smoking status was obtained from the health behavior survey. Education was classified as <=elementary school, <=middle school, <=high school, and >college or University. Occupation was divided into currently working and not currently working. Marital status was classified by the presence/absence of spouse. Participants were also asked if they were smoking. While categorical variables were analyzed by chi-square test, continuous variables were analyzed by independent t-test.

Chronic condition

The health interview surveyed major chronic diseases by asking respondents questions such as "Have you experienced any chronic diseases during past years?" In the survey, respondents were asked: "Was the chronic disease diagnosed by a physician?". "Chronic diseases" were defined as diseases lasting at least three months in the preceding 12 months. Seven categories of major chronic diseases, in accordance with The International Classification of Diseases, 10th Revision Clinical Modification (ICD-10-CM), were selected for this study, and these groups were: 1) hypertension (I10-I15); 2) hyperlipidemia (I70); 3) stroke (I60-I69); 4) coronary heart disease (I20, I23-I25); 5) arthritis (M05-M09, M11-M13, M15-M19), 6) diabetes (E10-E14), and 7) depression.

Mobility limication

Impairment of mobility was measured using the mobility domain of the Korean version of the European quality of life questionnaire (EQ-5D). The EQ-5D is composite measure of health outcomes that consists of five domains: mobility, self-care, daily activity, pain/discomfort and anxiety/depression. The mobility index consisted of the following three statements, and participants selected the statement that best described them: 'I have no problem in walking about', 'I have some problems in walking about' and 'I am confined to a bed'.

Physical activity

Physical activity was categorized into either moderate or vigorous based on the American College of Sports Medicine (ACSM) classification. Moderate physical activity is aerobic PA for more than 30 minutes per session, more than 5 days a week. Vigorous physical activity is aerobic PA for more than 20 or more minutes, more than 3 days a week.

Statistical analysis

Data were analyzed by the SPSS/PC statistical program (version 17.0 for Windows; SPSS, Inc,. Chicago, IL). The Chi-square, independent t-test, multiple logistic regression analyses were conducted and p-values of less than 0.05 was considered statistically significant.

Results

General characteristics

Demographic and anthropometric characteristics of the study population are presented in Table 1. The analyzed sample included 830 males and 1134 females. The mean age of the studied population was significantly different for each gender (t=-2.12, p<.05) and was 69.84 years old for male and 70.45 years old for female. Body mass index (BMI), systolic blood pressure (SBP), total cholesterol (TC), High Density Lipoprotein Cholesterol (HDL-C) levels, triglyceride (TG) levels were significantly higher in females than males (p<.0001). Males has higher education than females (F=23.09, p<0.001) but there was no gender difference in marital status. Males were more likely to live with a spouse than females were (F=36.6, p<0.0001) and were more likely to work than females (F=78.48, p<0.001).

	Male (n=830) Mean ± sd or n (%)	Female (n=1134) Mean ± sd or n (%)	T or chi-square	p
Age (yrs)	69.84 ± 6.54	70.45 ± 7.03	-2.12	0.036
Weight (kg)	65.50 ± 9.52	56.08 ± 8.91	20.84	<0.0001
BMI (kg/m2)	23.54 ± 2.91	24.35 ± 3.72	-6.09	<0.0001
SBP	127.26 ± 17.26	129.84 ± 17.52	-3.4	<0.001
DBP	74.80 ± 10.45	74.49 ± 9.85	0.693	n.s.
TC	181.77 ± 34.61	197.03 ± 36.13	-9.42	<0.0001
HDL	48.07 ± 11.89	51.04 ± 11.89	-5.44	<0.0001
TG	134.12 ± 94.55	135.89 ± 78.03	-0.44	n.s.
EQ-5D	0.92 ± 0.90	0.85 ± 0.181	8.95	<0.0001
Education				
Elementary	334 (34.7)	825 (64.2)		
Middle	147 (15.3)	137 (10.7)		
High	218 (22.6)	122 (9.5)		
>college	135 (14.0)	53 (4.1)	230.09	<0.0001

Marital status				
Married	956 (99.8)	1278 (99.8)		
Single	2 (0.2)	3 (0.2)	0.016	n.s.
Living Arrangement				
with spouse	881 (92.1)	724 (56.5)		
spouse / separate	5 (0.5)	7 (0.5)		
widow/er	54 (5.6)	533 (41.6)		
Divorced	15 (1.6)	14 (1.1)	367.6	<.0001
Perceived health				
Very good	35 (4.2)	22 (1.9)		
Good	197 (23.5)	187 (16.3)		
Fair	407 (48.5)	539 (47.0)		
Poor	154 (18.4)	304 (26.5)		
Very poor	46 (5.5)	96 (8.4)	41.32	<.0001

Table 1: General Characteristics.

Health characteristics

Health characteristics of study population are shown in Table 2. Males were more likely to report healthier than female (F=41.32, p<0.001). Females have more hypertension (53.2 *vs.* 46.5%, F=8.81, p<0.01), high lipid profile (16.4 *vs.* 24.7%, F=19.92, p<.001), and arthritis (16.2 *vs.* 47.2%, F=21.76, p<0.001) than that of male. In addition, females have experienced more depression (16.4 *vs.* 9.6%, F=20.83, 0<0.001), and suicidal thoughts (19.9 vs 10.7%, F=26.7, p<.001) and limited activity (15.6 *vs.* 12.0%, F=4.98, p<0.05) than that of male.

	Male n (%)	Female n (%)	Chi-square	p
Hypertension	390 (46.5)	611 (53.2)	8.81	<0.01
High Lipid profile	138 (16.4)	284 (24.7)	19.92	<0.001
Stroke	49 (5.8)	34 (3.0)	10.04	<0.01
Ischemic/MI	71 (8.5)	80 (7.0)		n.s.
Arthritis	136 (16.2)	541 (47.2)	21.76	<0.001
Diabetes	171 (20.4)	190 (16.6)	4.75	<0.05
Thyroid	11 (1.3)	75 (6.5)	31.96	<0.001
2weeks+ depression	29 (9.6)	211 (16.4)	20.83	<0.001
Suicide consideration	103 (10.7)	243 (18.9)	26.7	<0.001
Activity limitation	116 (12.0)	210 (15.6)	4.98	<0.05

Table 2: Health Characteristics of population.

Prevalence of physical activity

The prevalence of physical activity, in relation to the current ACSM physical activity recommendations is shown in Figure 1. 70.6% of older adults were never physically active and 16.9% of older adults did not perform enough exercise. Only 12.5% of older adults performed the ACSM recommended amount of PA. More men performed the ACSM recommended amount of PA than women (F=21.22, p<0.0001). 8.5% of males and 6.3% of females performed vigorous PA (F=24.02, p<0.0001), and 7.5% of males and 5.4% of females performed moderate PA (F=3.57, p<0.05).
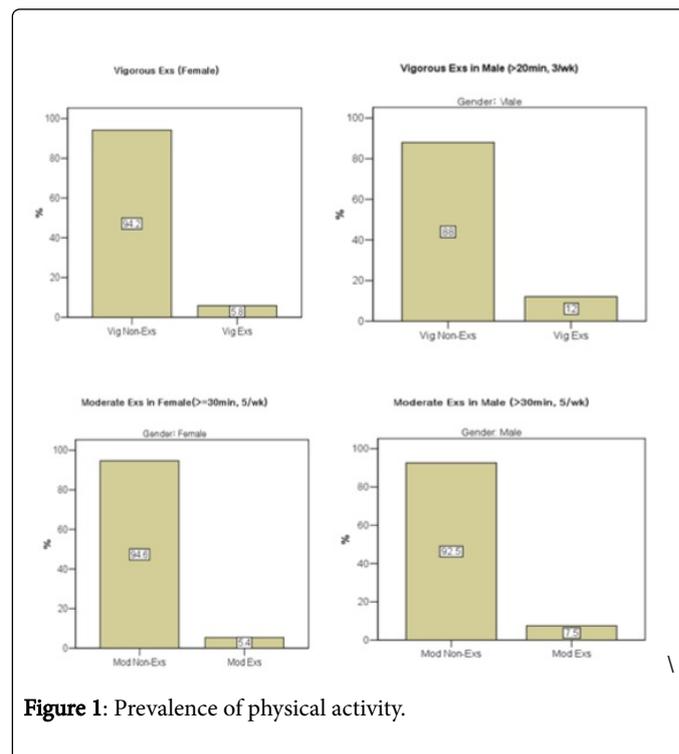

Figure 1: Prevalence of physical activity.

Determinants of physical activity participation

The results of logistic regression analysis were shown in Table 3. For males, age (OR: 0.94, 95 CI: 0.88-1.00), perceived health (OR: 2.30, 95%CI: 1.39-3.80), and activity limitation (OR: 3.96, 95% CI: 1.21-12.94) significantly affected physical activity participation. Whereas any of these factors do not affect physical activity participation in females.

Discussion

The recommendation of American College of Sports Medicine (ACSM) indicated that "Every adults should accumulate 30 minutes or more of moderate-intensity physical activity, on most, preferably all, days of the week [8]. Unlike exercise recommendations for adults, exercise recommendations for seniors differed in intensity based on their fitness [9].

In the present study, older Koreans were shown to have relatively low levels of physical activity participation. Males are generally more active than females, and physical activity is lower in successive age groups like in the previous study [10,11].

Variable	Male		Female	
	Adjusted OR (95% CI)	p*	Adjusted OR (95% CI)	p*
Age	0.94 (0.88-1.00)	0.05*	0.96 (0.90-1.02)	0.17
Income	1.43 (1.10-2.02)	0.04*	1.27 (0.90-1.80)	0.18
Education	1.29 (0.92-1.81)	0.15	1.32 (0.84-2.06)	0.23
Occupation	1.01 (0.83-1.23)	0.92	0.96 (0.72-1.80)	0.79
Living Arrangement	0.33 (0.10-1.11)	0.07	1.10 (0.75-1.60)	0.63
Perceived health	2.30 (1.39-3.80)	0.01*	1.40 (0.90-2.19)	0.14
Hypertension	1.33 (0.61-2.92)	0.48	0.61 (0.27-1.33)	0.21
High lipidemia	0.93 (0.40-2.19)	0.87	1.05 (0.50-2.22)	0.9
Arthritis	1.08 (0.38-3.03)	0.89	1.60 (0.77-3.35)	0.21
Diabetes	1.10 (0.25-4.77)	0.9	0.42 (0.08-2.16)	0.3
Activity limitation	3.96 (1.21-12.94)	0.02*	0.88 (-.36-2.15)	0.78

Table 3: Determinants of physical activity participation.

Only twelve percent of Korean elders met the recommendation of accumulating at least an hour of physical activity on most days of the week. This raises public concern in Korea because the Korea Government has made efforts to increase the level of physical activity in seniors. These include: 1) setting a goal of physical activity participation in the National Health Plan 2020 and 2) utilizing major government organization such as National Health Insurance Services, Ministry of Culture, Sports and Tourism, and Long-term care services to disseminate physical activity programs in the community level (Hong, 2010). Further, there need to be attention brought for seniors who exercise daily but not enough to meet the ACSM's recommendation.

One explanation is that the result may have been underestimate from misclassifying moderate and vigorous activity. Misclassification of activity intensity may be related to the application of MET cutoffs to self-reported data.

Further, exclusion of occupation and means of transportation may explain why Korean older adults had lower level of physical activity. Data from self-reported surveys that focus primarily on leisure-time activity find that the Hispanic population has the lowest level of activity among racial/ethnic groups [13].

It is important to recognize that the current recommendation to accumulate to 30 minutes of physical activity on most days is based on epidemiological association between self-reported physical activity and health outcomes (Australian Government Department of Health and Aging). Epidemiological relationships based on objective measures might result in different recommendations for physical activity levels. Less than 30 minutes per day of physical activity, as measured by an accelerometer, may provide significant health benefits, because lower levels of objectively measured physical activity correspond to higher levels of self-reported physical activity.

In this study, younger age, moderate to excellent perceived health, and less activity limitation were significant factors affecting physical activity participation in male older adults, but none of these variables affect physical activity participation in female older adults. These findings agree with previous studies [15,16]. Our findings extend previous studies by identifying the factors of activity among older persons that have varying levels of perceived health and functional limitation [17]. Health and activity limitation were highly related to physical activity participation: having better self-rated health and fewer limitation in activity resulted in higher PA activity. This finding has particular importance for older persons who are likely to have multiple chronic diseases and may believe that participation of physical activity would be injurious to their compromised health.

These individuals may need to be educated about safety of certain activity and the recommended levels of difficulty that would benefit them. More efforts may need to be expended to disseminate this message to frail older adults [18].

The lack of variables, such as psychological program based, and environmental factors, in the dataset may explain the lack of factors that were associated with older women's PA participation. For instance, unlike for older men, caregiver duties are important barriers to physical activity participation among women[19,20] but is not included in this analysis.

We should note several limitations in our study. There was a limited ability to confer causal inference from the relationship observed because of the cross-sectional nature of the study. Further, our data may exclude potential variables that affects physical activity participation such as psychological and environmental factors. Second, the data is self-reported and could potentially differ from objective assessments, which have their own limitations. Third, KNHANES was conducted among a non-institutionalized Korean population, and because participants who were physically unable to be examined were not included in our analysis, the prevalence of PA participation may have been underestimated.

The fact that specific forms of physical activity were not available is a limitation of the current study. In addition, hindrances precluding the achievement of physical activity and day-to-day variability in physical activity were not assessed. Considering leisurely activities, including hiking and commuting would have provided an important domain that was not explicitly addressed.

In summary, the proportion of older Koreans who are physically active is low. Additionally, the majority of seniors who are active did not meet the ACSM guideline of physical activity level. With the increasing number of older people in Korea, rates of functional limitation and disability could increase substantially over a relatively short period. This could have profound impact on future rates of health care, as well as long-term care expenditure in Korea. The application of multifaceted approaches to increase physical activity level in Korea should be given a high priority.

It is a challenge for a person with limited activity to develop a physical activity plan, which combines preventive and therapeutic recommendations. Therefore, to promote seniors' participation in

regular physical activity, strategies to enhance the level of physical activity participation should be applied differently according to gender.

Conclusion

The prevalence of the physical activity participation was lower in older Korean than previous reported in other country. The associated factors of physical activity participation were different by gender. Further studies are strongly needed to explain this gender differences and make an appropriate strategy to enhance physical activity participation in the older population.

Acknowledgement

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