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Original Article

Study of the physical condition of middle-aged workers by gender

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Abstract. [Purpose] The purpose of this research was to investigate the physical condition of middle-aged workers in Korea by gender. [Subjects] In total, 2,644 middle-aged workers (male, n = 2,175; female, n =469) ≥50 years of age from eight geographical areas were evaluated from 2007 to 2008. [Methods] The subjects' physical condition, muscular endurance, reaction, flexibility, agility and age of physical strength were evaluated. [Results] The physical condition and exercise status of males were superior to those of female workers. Male workers exhibited a higher rate of smoking than female workers, but had better muscular endurance, reaction, agility and age of physical strength. [Conclusion] Middle-aged female workers in Korea have a poorer overall physical condition than middle-aged male workers. The physical condition of middle-aged and elderly workers must be managed through various health management programs to maintain a productive aging society.
Key words: Elderly workers, Physical condition, Gender

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INTRODUCTION

The whole developed world has entered the aging era, and South Korea has been named one of the OECD countries that has the most rapidly aging population[1)]. In addition, the birth rate of South Korea has recently been determined as being the lowest among OCED countries, and this is a well-established indicator forecasting South Korea's likelihood of facing even more serious economic and social issues as a consequence of population aging[2)]. Despite this situation, it has been observed that older South Koreans' participation in economic activities is relatively high compared to that of seniors in other nations, and it is assumed that this higher economic participation rate could be utilized as an effective countermeasure for the economic and social issues that South Korea will face because of its aging population[3)]. However, for this to be effectively exploited, we need to understand how middle-aged workers keep themselves physically healthy.

Several studies have reported in the past that workers' physical abilities sharply decrease before or after they turn 50 years old, and these deteriorations in physical reactions and balance make aged workers more vulnerable to industrial accidents than workers in younger age groups. Experts have been suggesting that aged workers should be made aware of their physical strength or physical functions for the preservation of their health and occupational safety[4)]. The meaning of health for aged-workers, in comparison to other age groups, is considered to be a factor that has a relatively significant influence on their satisfaction with life. For aged workers, being in good health means more than being diagnosed without disease, it also means being equipped with the functional strength that helps them perform their everyday activities both safely and independently in such a way that they do not feel very tired[5)]. From the viewpoint of industrial health science focusing on aged workers, maintaining and improving the physical condition of middle-aged workers, which should eventually increase the productive age of workers, is considered a task that most countries in the world should take seriously[6)]. But even so, research on middle-aged workers' physical condition has gained little attention in any relevant field, and in particular, proper workout programs which take into account physical condition which differ according to gender, or other factors affecting workers' physical condition, have not been thoroughly investigated. Since gender may have an effect on which part of the body weakens first during aging, it is an important topic of research[7)].

In light of this, this study examined the physical condition of middle-aged workers in their fifties or older based on gender, in order to determine which factors influence middle-aged workers' physical condition. Based on the findings, the study aims to develop gender-differentiated workout methods and generate ideas about enhancing workers' health.

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SUBJECTS AND METHODS

This study was carried out from January of 2007 to December of 2008 targeting a total of 2,644 (2,175 males and 469 females) middle-aged workers living in South Korea, who were over 50 years old. The inclusion criteria for the survey subjects were blood pressure in the normal range and the absence of abnormal symptoms in relation to maximum oxygen uptake or heart rate when the subjects were in a resting condition. The lead researcher provided the survey subjects with accurate information on the study's aims, how the subjects would participate in the research, and what procedures they would perform. Afterwards, a questionnaire was given only to those workers who had agreed to participate in the research and whose physical condition had been assessed. A hand-held dynamometer was used to measure physical strength. The research subjects were tested for muscular endurance, reaction, flexibility, agility and age of physical strength. All details of this study's procedures were submitted to the Science Research Council of Inje University, which approved the study protocol.

Muscular endurance was measured using sit-ups, which effectively gauge the kinetic endurance of abdominal muscles. The subjects were instructed to sit up until their elbows touched their thighs on hearing an electronic prompt. The sit-up test lasted for 30 seconds, and the number of successful sit-ups was recorded. Reaction was measured through a standing-jump test. The study used the duration of the time in the air to measure how high a participant had jumped using a mat with a sensor attached. The subjects performed two trials, and the maximum scores were recorded in centimeters. To test flexibility, the research subjects did a test in which they bent their upper body forward. First, they sat with straight knees, and then bent their upper body forward with the tips of the two opposite fingers facing parallel with each other. The subjects maintained this posture for two seconds, and the most successful result of two trails was recorded. Agility was measured by examining the subjects' general physical reactions. The subjects stood with their knees bent slightly, and when they were given a signal, they jumped as quickly as possible. The shorter the reaction time, the better the result. Again, the subjects performed two trials, and the best result was recorded. The age of physical strength indicates at what age level the body performs after all the results gained from the tests above were examined.

For data analysis, we used SPSS 18.0. To compare differences between the two groups of middle-aged male and female workers, we carried out the independent-samples t-test. The level of the statistical significance was chosen as 0.05.

RESULTS

Of all the middle-aged workers who participated in the research, 2,644 (82.3%) of them were males and 469 (17.7%) were females. The average age of the male workers was 53.2, and that of the female workers was 52.9 (Table 1). In terms of the physical condition of the middle-aged workers, the male workers demonstrated better results for exercise status and dietary habits than the female workers ($p<0.05$). The survey revealed that the male workers exercised more often as they were eating more regularly. However, the smoking rate was confirmed to be lower among female workers ($p<0.05$). No significant difference was discovered in relation to alcohol consumption between the male and the female workers (Table 2).

Table 1. General characteristics of the survey participants (n=2,644)

	Male (n=2,175)	Female (n=469)
Age	53.2 ± 3.2	52.9 ± 2.7

Table 2. Subjective physical conditions by gender (n=2,644)

	Male (n=2,175)	Female (n=469)
	M±SD	M±SD
Exercise status	1.8±0.8[a**]	2.3±0.8**
Dietary habit	1.3±0.4**	1.5±0.5**
Smoking status	2.1±0.7*	1.5±0.6*
Drinking status	1.9±0.7	1.3±0.6

[a]Values are mean±SD, *Significant difference $p<0.05$, **Significant difference $p<0.01$

The results of body strength measuring tests based on gender are presented in Table 3. Compared to the female workers, the male workers recorded significantly superior results in the measurements of muscular endurance, reaction, agility and age of physical strength while the female workers showed significantly better flexibility than the male workers ($p<0.05$).

DISCUSSION

This study investigated how individuals' health conditions were affected by gender, targeting middle-aged workers in their fifties and older. According to the finding the male workers had both better exercise status and better dietary habits than the female workers, but the female workers had a lower smoking rate. Previous research studies targeting married males and females reported that the females have less time to exercise than the males. Among the possible causes for the result, it is possible that females assumed that, other than career, they were responsible for multiple roles at the same time (such as housewife or mother) which made it hard for them to make time for physical activities[8]. In addition, after work, females still have other things to do at home. For instance, regularly preparing a meal on time is frequently considered impossible by female workers[9].

The test that measured physical strength confirmed that male workers were enjoying better health conditions than female workers in every category (muscular endurance, reaction, agility and age of physical strength) except flexibility. These findings agree with a previous study which argued that regular workouts not only prevent older workers from physical pain but also help them to maintain their abilities to do everyday tasks[10]. Both the degree of physical pain and the activity level of daily living are considered important factors affecting quality of life, and it is proven

Table 3. The results of physical measurements by gender

	Male (n=2,175)	Female (n=469)
	M±SD	M±SD
Muscular endurance (Sit-ups: times)	18.9±4.3**	9.8±5.2**
Reaction (Standing jump: cm)	34.9±7.5**	21.1±5.6**
Flexibility (Sit and reach: cm)	10.9±7.5**	16.5±6.9**
Agility (General physical reactions: m/sec)	285.3±82.7**	362.1±159.6**
Age of physical strength (years)	47.3±5.9**	48.1±6.1**

[a]Values are mean±SD, *Significant difference $p<0.05$, **Significant difference $p<0.01$

that regular workouts eventually enhance the quality of life of an individual[11].

Since healthy workers have a better chance of continuing work and maintaining good health than unhealthy workers, developed countries have been introducing several different exercise programs aimed at lengthening the effective working age of older workers[12]. However, South Korea does not yet have any systematic programs that would encourage middle-aged workers to engage in proper workouts or activities, and the idea of designing relevant programs depending on gender is unpopular. Other mediating strategies should be used when trying to plan an exercise program depending on gender. In other words, when the subject is a male worker, it is necessary to use every different mediator as a main strategy to actually help subjects feel satisfied. On the other hand, for female workers, factors that interfere with their physical activities should be determined before developing a program that focuses on how to control such factors. For instance, consideration should be given to how female workers could win support from spouses or family members or how female workers could make good use of their lunch time or break in order to exercise[13].

This study revealed how the gender of middle-aged workers influences their health conditions, and both the bibliography and the results of the research can be used as basic data by researchers in relevant fields studying the health management of middle-aged workers based on gender. Every year, the number of middle-aged workers increases I workout programs targeting middle-aged workers are implemented, there will be positive changes in their physical strength as well as work performance. The results of this study suggest that various differences caused by gender should be carefully considered when designing exercise programs and that subsequent research should take a deeper look into how to design more efficient exercise programs tailored to gender.

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