



Korean Society of
Nursing Science

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Asian Nursing Research

journal homepage: www.asian-nursingresearch.com



Research Article

Relationship Between Long Working Hours and Metabolic Syndrome Among Korean Workers

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ARTICLE INFO

Article history:

Received 8 August 2016

Received in revised form

15 February 2017

Accepted 21 February 2017

Keywords:

employment

metabolic syndrome X

sex

work

SUMMARY

Purpose: This study investigated gender differences in the relationship between long working hours and metabolic syndrome.

Methods: Data based on the Sixth National Health and Nutrition Examination Survey (2014) pertaining to a total of 1,145 paid workers were analyzed. Working hours were divided into three groups (40–51 hours/week, 52–59 hours/week, ≥ 60 hours/week). The relationship between working hours and metabolic syndrome was then analyzed after adjusting for general and occupational characteristics, using a multiple logistic regression model.

Results: Working 40–51 hours per week was associated with the lowest metabolic syndrome among female workers (11.2%), whereas it was associated with the highest metabolic syndrome among male workers (28.0%). After adjusting for general and occupational characteristics, female workers working ≥ 60 hours per week showed odds ratios of 2.21 [95% confidence interval (1.07, 4.57)], compared to those who worked 40–51 hours per week. However, no clear association between long working hours and metabolic syndrome was found among male workers.

Conclusions: The results suggest that working long hours, especially ≥ 60 hours per week, is related to metabolic syndrome among female Korean workers.

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Introduction

According to a report by the Organization for Economic Cooperation and Development (OECD) [1], Koreans work for a total of 2,124 hours per year, ranking second after Mexico (2,228 hours) among the 34 OECD member states. Despite a reduction in the legal working hours to 40 hours per week, as a result of the 5-day working week introduced in 2004, this number is still 1.2 times higher than the OECD average, and 1.5 times longer than that of Germany, which has the shortest working hours. Industrialized countries have several types of working duration regimes and corresponding distributional patterns [2]. In some instances, working duration is effectively regulated by a strong statutory intervention (e.g., in France) and collective agreements play a dominant role in determining working hours (e.g., in Germany). However, the effectiveness of statutory standard hours is severely

limited, such that noncompliance or nonobservance and/or overtime work are the norm in Korea.

Prolonged labor not only reduces leisure time, but also influences workers' time use and overall lifestyle, and according to a survey conducted by a daily newspaper [3], difficulties getting off work on time accounted for 62.0% of the reasons as to why workers could not utilize the evening time, and work being tiring enough on its own accounted for 56.0% of the reasons. Prolonged labor may deteriorate one's health due to pressure on time utilization, limiting resting activities such as sleep time, and health promotion activities such as walking and exercise [4].

Recent studies [5,6] on prolonged labor and health have suggested that the practice has short-term and long-term negative influences on health. Short-term influences include stress, fatigue, lack of sleep, smoking, excessive drinking, and lack of exercise, whereas long-term influences include a higher prevalence of cardiovascular diseases, digestive diseases, genital diseases, musculoskeletal diseases, mental illness, and an increased risk of accidents and injuries during work. However, one study [7] found that the longer the working time, the worse a worker's health, except in the case of workers with less than 35 working hours per

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<http://dx.doi.org/10.1016/j.anr.2017.02.003>

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week. Interestingly, workers who worked less than 35 hours per week reported their health as worse than that of those who worked more than 60 hours per week. This means that workers are likely to choose shorter working hours because of existing health problems or other factors [7]. Thus, it is important to consider this when studying the relationship between working hours and health.

While prolonged labor affects workers' health and is especially considered a risk factor for cardiovascular diseases, studies on issues related to prolonged labor and health in Korea are restricted to prolonged labor and depression [8,9] or suicidal thoughts [10]. Therefore, it has been suggested that studies should examine indicators that can more objectively verify the influence of work hours on health especially including obesity and metabolic syndrome, which are primary indicators of cardiovascular health influences. Metabolic syndrome is one of the most serious public health concerns in Korea, and the overall prevalence rate of metabolic syndrome in Korea is 18.8% [11]. However, studies on the relationship between prolonged labor and metabolic syndrome have been extremely limited [12,13]. Moreover, there have been studies [14,15] focusing not only on the relationship between working hours and metabolic syndrome, but on the correlation between working hours and individual factors such as diabetes, hypertension, and obesity. These showed that long working hours actually reduce the risk of diseases; so, replication studies are necessary.

Researchers have reported gender differences in working hours and health conditions [16]. However, many studies on the health impact of long working hours have been limited to male workers [12–15]. More studies regarding this issue on women workers are needed, so as to identify the health impact of long working hours on this group. Thus, the current study examined the relationship between working hours and metabolic syndrome according to gender, targeting paid workers who work more than 40 hours per week. Findings from this study will be used for the health management of individual workers and policy development for all workers.

Methods

Study design

Secondary data analysis was undertaken, based on prospectively collected survey data.

Setting and sample

This study is a secondary analytic study, and used existing data collected in the second year of the Sixth National Health and Nutrition Examination Survey (KNHANES), conducted by the Ministry of Health and Welfare and the Korea Centers for Diseases Control and Prevention. The KNHANES assesses the health and nutritional status of Koreans, monitors trends in health risk factors and the prevalence of major chronic diseases, and provides data for the development and evaluation of health policies and programs in Korea. The KNHANES employed the multistratified cluster sample extraction method, and is representative of the Korean population. For the sixth-term data (2014), the extraction frame was stratified based on city/province, *dong*, *eup*, *myeon*, and residence type (i.e., conventional houses and apartments), whereas the living space ratio and householder academic-background ratio were used as internal stratification criteria. The number of survey participants in the sixth-term and the second year was 9,701, and 7,550 people participated in the study. The participation rate was 77.8% (KCDC, 2014). Among the 1,911 paid workers from the survey data, 1,217 persons were identified as working for more than 40 hours per week and as having metabolic syndrome.

Ethical considerations

Use of the original data was approved by the Korean Centers for Disease Control and Prevention. We obtained anonymized data.

Measurement

Metabolic syndrome

For metabolic syndrome, the criteria are based on outcomes of a meeting between several major organizations attempting to unify criteria [17], whereas the waist measurement criterion is based on the value suggested in “the Asia-Pacific Perspective: Redefining Obesity and Its Treatment” [18], according to the WHO. Those meeting three or more of the following standards were selected: (a) waist measurement at 90 cm or greater for males and at 80 cm or greater for females; (b) triglyceride at 150 mg/dL or higher; (c) high-density lipoprotein cholesterol at less than 40 mg/dL for males, and at less than 50 mg/dL for females; (d) systolic blood pressure at 130 mmHg or greater, diastolic blood pressure at 85 mmHg or greater, or administering hypertension medicine; (e) fasting blood sugar at 100 mg/L or higher, or administering blood sugar regulation medicine. Metabolic syndrome was determined on the basis of preceding criteria.

Working hours and labor condition characteristics

For working hours, the question, “What are the average weekly working hours at work, including overtime (excluding meal time)?” was used. Working hours were categorized into three groups, according to the Labor Standard Act: the 40–51 hours/week, the 52–59 hours/week, and the ≥ 60 hours/week. Modified working hours and employment status were used to measure labor condition characteristics. Modified working hours were measured using the question, “Do you mostly work during the day (6 am–6 pm) or during other hours?” Responses were categorized into the day/evening group, including those who worked during the day (6 am–6 pm) and evening (2 pm–midnight), the night (9 pm–8 am) group, as well as the shiftwork group. Employment status was determined through the question, “Is your current job (work) regular (guaranteed employment until retirement) or irregular (temporary, atypical, dispatch, short-term worker, sub-contract, etc.)?” Responses were categorized into regular and irregular.

Demographic and health behavior characteristics

Demographic characteristics included age, gender, level of education, household income quartile, living arrangement, and marital status. Age was categorized into ≤ 29 years, 30–39 years, 40–49 years, 50–59 years, and ≥ 60 years. The level of education was categorized based on graduation status, such that completion, withdrawal, enrollment, and leave of absence were categorized with the preceding academic background, and graduation as the corresponding academic level. The categories were as follows: \leq elementary school, middle school, high school, and \geq college. For economic status, the average monthly, equalized household income, with the household income adjusted for the household size, was used. Household income was categorized into four groups according to income quartile, which was calculated by gender and a 5-year unit of age. Living arrangement was categorized into living alone or with cohabitants. Marital status was categorized into single, married, divorced, or widowed.

Health behavior characteristics included smoking, drinking, physical activity, and hours of sleep. For smoking, taken to indicate smoking history, those who indicated having smoked 5 packs (100 cigarettes) or more and those who were currently smoking were

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