



Original Article

Association between weekend catch-up sleep duration and hypertension in Korean adults

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ABSTRACT

Objective: Our objective was to investigate if weekend catch-up sleep is independently related to a decrease in the risk for hypertension in Korean adults.

Methods: The subjects included 2782 Korean adults ages 19 years and older. Data on demographic variables, sleep duration (weekday and weekend), and hypertension were obtained using questionnaires. Logistic regression analyses were performed to test the association between hypertension and sleep duration (weekday and weekend catch-up sleep duration); we also adjusted for possible covariates.

Results: After adjustment for confounding variables, we found that individuals who slept less than 6 hours a night had an increased odds ratio (OR) for hypertension (OR, 1.73; 95% confidence interval [CI], 1.13–2.64) compared to individuals who slept 7 to <8 hours a night. Furthermore, one hour of weekend catch-up sleep was significantly associated with decreased risk for hypertension (OR, 0.83; 95% CI, 0.72–0.95). There were significant differences for groups with and without subjective sleep insufficiency in the association between weekend catch-up sleep duration and the prevalence of hypertension; in addition, the effect of an extra hour of weekend catch-up sleep per night on hypertension was stronger in those subjects who experienced subjective sleep insufficiency (OR, 0.61; 95% CI, 0.46–0.82).

Conclusions: Sleeping more on the weekend to compensate for weekday sleep deficit could lower the risk for hypertension in Korean adults, especially in Korean adults who have the subjective symptom of sleep insufficiency.

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1. Introduction

Hypertension is a major health concern because of its high prevalence and associations with cardiovascular and renal diseases as well as diabetic vascular complications. Accordingly, effective management of hypertension has become an important issue [1]. Although the proportion of hypertension patients who undergo blood pressure controls has increased over the past decades, many Korean patients still do not have optimal blood pressure levels [2]. Lifestyle modifications such as changes in diet, aerobic exercises, and stress control have been considered important in hypertension management. Several recent epidemiologic studies have reported an association between hypertension and short sleep duration [3–6]. Sleep deprivation studies have shown significant increases

in blood pressure among normotensive subjects and hypertensive patients after nights when sleep was restricted to 3.6 to 4.5 hours [7,8].

Further research is required to investigate the biologic mechanisms that link short sleep duration and high blood pressure. If short sleep duration functions do indeed increase blood pressure, then interventions that increase sleep duration and improve sleep quality could potentially serve as treatments and primary preventive measures for hypertension [4]. Sleep duration as well as physical activity and smoking habits are considered lifestyle factors. However, sleep duration is not chosen freely; it may be affected by physical, mental, or social conditions [9].

Within competitive sociocultural environments, many Korean workers are likely to shorten their sleep duration in favor of a social dinner with a co-worker or their required work on a weekday. In these instances, they will then tend to compensate for their weekday sleep deprivation by sleeping more on weekends. To date few studies have investigated the relationship between weekend catch-up sleep and hypertension among Korean adults. We

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hypothesized that if weekend catch-up sleep was independently associated with hypertension, then increasing the duration of weekend sleep could serve as a primary prevention in addition to increased weekday sleep duration. Thus, we differentiated between weekday sleep duration (usual sleep duration) and weekend catch-up sleep duration (additional sleep duration) for the sleep duration parameter, instead of using the mean duration of sleep throughout the week.

Therefore, the objectives of our study were to evaluate the relationships between weekday sleep duration and prevalent hypertension and to investigate if weekend catch-up sleep is independently related to a decreased risk for hypertension in Korean adults.

2. Methods

2.1. Study population and survey method

The subjects in our study comprised adults aged 19 years and older who resided in South Korea. The estimated population of Korea in 2009 was 49,759,000, of whom approximately 37,782,000 were aged 19 years and older. The number of target population was 2800 in our study. The survey was conducted by Gallup Korea in 2010 using multistage clustered sampling from 15 administrative districts (metropolis/province); all administrative districts except Jeju Island (province) were included. All administrative divisions that were further divided into si, gun, or gu, which are the basic administrative units in South Korea. In total, there were 75 si (small to medium cities), 88 gun (rural areas), and 73 gu (metropolitan areas) in the 15 South Korean administrative units that were included in our study. First Gallup Korea allocated sample numbers to each administrative district according to the population distribution. Next they selected 60 representative basic administrative units (si, gun, and gu) to represent 15 administrative districts. Subsequently, they approached 7615 individuals and a total of 2836 subjects according to the population distributions of sex and six age groups (19–29 y, 30–39 y, 40–49 y, 50–59 y, 60–69 y, and ≥ 70 y) completed this survey [10]. Therefore, the sampling rate of our study was about 7.5 individuals per 100,000 and the response rate was 37.2%. This calculation was done using the proportionate quota sampling method.

Seventy-six interviewers participated in this survey. Before the face-to-face interview, trained interviewers explained the purpose of the study to all eligible individuals and requested their participation. Respondents gave informed consent before the beginning of the survey. We excluded 54 subjects with missing questionnaire responses on smoking status, alcohol consumption, exercise, education level, and body mass index (BMI); hence, we used data from 2782 participants for our analyses (Fig. 1). The study was approved by the institutional review board of the Soonchunhyang University, Cheonan Hospital and by the institutional review board of Gangnam Severance Hospital, Yonsei University College of Medicine.

2.2. Sleep habits questionnaire

The major independent variables for our study were weekday and weekend sleep duration. Individuals' average weekday and weekend sleep durations over the previous month were recorded from their answers to a question on the average number of hours that they slept in the past month. The answers were provided as follows: (1) weekday: () hours () minutes, and (2) weekend: () hours () minutes. Weekend catch-up sleep duration was calculated as the weekend sleep duration minus the weekday sleep duration. Subjective sleep insufficiency was assessed using questions that asked the subjects if they received enough sleep. Another question

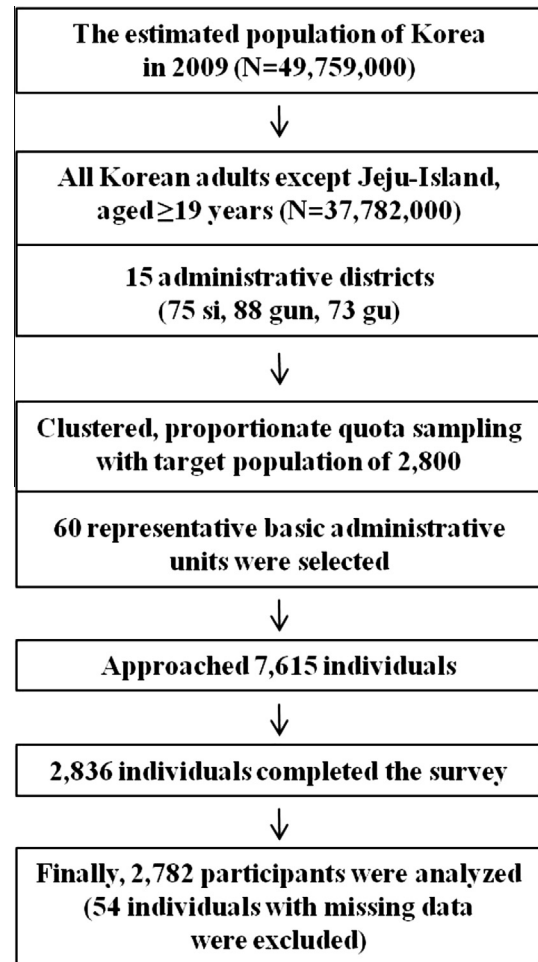


Fig. 1. Flow chart of the sampling procedure.

asked the subjects the number of hours that they would like to sleep. The subjects were required to answer the questions and provide the number of hours and minutes.

2.3. Hypertension

The primary outcome of interest in our study was the presence of hypertension, defined as self-reported hypertension or high blood pressure. This was ascertained by a yes response to the question, "Have you ever been told by a doctor or health professional that you have hypertension?"

2.4. Other measures

Information on age, sex, education level, physical activity, smoking status, and alcohol consumption was self-reported. BMI was calculated by dividing the self-reported weight in kilograms by the self-reported height in meters squared.

2.5. Statistical analysis

We performed all statistical analyses using STATA (version 11.0, StataCorp, College Station, TX, USA). Unadjusted differences in continuous and categorical variables across weekday sleep duration categories were assessed for significance using the analysis of variance (ANOVA) or the χ^2 test, as appropriate. We used logistic regression analyses to examine odds ratios ([ORs], 95% confidence

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