

## Relationship between trait-anger and sleep disturbances in middle-aged men and women

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### Abstract

**Objective:** The present study was performed to determine whether high levels of trait-anger (T-Anger) are independently associated with sleep disturbances and quantitative and qualitative measurements of sleep in middle-aged adults. **Methods:** Enrolled in the study were 2404 men and 2291 women derived from the Korean Health and Genome Study (KHGS), which is an ongoing population-based prospective study. The Spielberger Trait Anger Scale was used to measure T-Anger. **Results:** Sleep disturbances, including difficulty in initiating and maintaining sleep (DIS and DMS, respectively) and early morning awakening (EMA),

significantly increased with increasing levels of T-Anger ( $P < .05$  by test for trend). Nonrestorative feelings in the morning and excessive daytime sleepiness were also strongly associated with higher levels of T-Anger. After adjusting for other potential risk factors, the high and/or moderate T-Anger showed 40% to 70% increases in the odds for sleep disturbances. **Conclusion:** The present study provides evidence that high levels of T-Anger are independently associated with symptoms of disturbed sleep in middle-aged adult population.

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**Keywords:** Anger; Sleep; Sleep disturbance; Trait-anger

### Introduction

Sleep disturbance has been well recognized as both an early sign of and even the risk factor for depression [1]. To date, the occurrence of sleep disturbance has been largely understood within the behavioral model of insomnia [2]. Within the model, sleep disturbance is caused by the interaction between predisposing and precipitating factors. Over the last three decades, although a number of empirical and epidemiological studies have been performed to establish the predisposing factors, it was still limited that personality characteristics may confer risk. Moreover, most researches have focused on depression and anxiety [3–6]. Although anger is one of the basic emotions [7,8], and the deleterious

consequences of anger/hostility and anger expression on physical health have been well reported [9–11], few studies have been performed on the impact of anger on sleep disturbance [12–14].

Therefore, in the current study, we hypothesized that higher level of trait-anger (T-Anger) is independently associated with sleep disturbances and other quantitative and qualitative measurements of sleep in the middle-aged Korean men and women.

### Methods

#### Participants

The present study represents a cross-sectional investigation derived from the Korean Health and Genome Study (KHGS) supported by the Korean National Institute of Health

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(KNIH). The KHGS is an ongoing population-based prospective study of Korean adults aged 40–69 years initiated in 2001, for the purpose of investigating the relationship between risk or lifestyle factors and chronic diseases. Participants enrolled in the present study were participants in the Ansan cohort of the KHGS. Study enrollment in Ansan cohort was based on random selection from directory listings that were made available on compact discs by local telephone companies. After 10,957 telephone calls, 2523 men and 2497 women agreed to participate in a baseline examination. All the participants were interviewed by trained researchers about health status and underwent a first cycle of physical examinations in Korea University Medical Center. Procedures were in accordance with institutional guidelines and were approved by an institutional review committee of the KNIH. Informed consent was obtained from all study participants. For the present study, 35 (0.7%) participants with doctor-diagnosed psychiatric disorders and 290 (5.8%) with incomplete data were excluded. Thus, the study involved 4695 individuals (2404 men; 2291 women) who were available for analysis.

### Measurements

#### Sleep disturbances and other sleep-related variables

Three questions were included to assess difficulties in initiating sleep (DIS) and maintaining sleep (DMS) and early morning awakening (EMA) over the previous month.

1. Do you have difficulty falling asleep at night?
2. Do you wake up during the night after you have gone to sleep and have difficulty getting back to sleep?
3. Do you wake up too early in the morning?

Participants who answered once a week or more to Questions 1, 2, and 3, respectively, were defined as those suffering from DIS, DMS, and EMA.

Participants' quantitative and qualitative measurements of sleep were also assessed, i.e., their total sleeping time, time to bed, time to get up, sleep latency, irregularity of sleep, sleepiness in the morning, fatigue in the morning, feeling of heaviness in the head in the morning, napping, and hours of napping. In addition, daytime sleepiness was measured using the Epworth Sleepiness Scale (ESS), a frequently used subjective sleepiness scale that consists of an eight-item self-administered questionnaire [15].

#### Trait-anger

The Spielberger Trait Anger Scale [7] was used to measure T-Anger, which contained two factors: T-Anger temperament (T-Anger/T), which measures the general disposition toward angry feelings (e.g., "I am quick tempered"), and T-Anger reaction (T-Anger/R), which measures the tendency to express anger when one is criticized (e.g., "I get angry when I'm slowed down by others mistakes"). Each of these factor was composed of five items endorsed on a four-

point anchor and included the following: almost never=1, sometimes=2, often=3, and almost always=4. The sum of the responses for the items comprised the overall T-Anger score, which ranged from 10 to 40. High T-Anger was defined by scores of 22 to 40, moderate T-Anger by scores of 15 to 21, and low T-Anger by scores 10 to 14 [9,16].

#### Other variables

General characteristics include the following: age, gender, marital status, occupation, educational level, income, current alcohol drinking, and current smoking. Depression was measured using the Beck Depression Inventory (BDI), which consists of 21 items that measure feelings of sadness, guilt, failure, pessimism, loss of pleasure, worthlessness, agitation, irritability, tiredness or fatigue, loss of interest in sex, etc. [17]. The Korean-language version of the BDI has been validated and been used, with acceptable results [18,19]. Height (0.1-cm accuracy) and weight (0.1-kg accuracy) were measured, and body mass index (BMI) was calculated as  $\text{kg/m}^2$ .

#### Statistical methods

General characteristics, T-Anger scores, frequencies of sleep disturbances, and the sleeping habits between men and women were compared using the chi-squared test for categorical variables and the Mann–Whitney *U* test or

Table 1  
Comparisons of general characteristics sleep disturbances, and trait-anger (T-Anger) scores between men and women

Variables	Men ( <i>n</i> = 2404)	Women ( <i>n</i> = 2291)
Age (years)***	48.5±7.4 <sup>a</sup>	49.4±8.1
Current alcohol drinking [%]**	73.3	29.3
Current smoking [%]***	44.2	3.2
Physical illnesses [%]	19.1	21.5
DIS <sup>b</sup> (≥once/week) [%]***	10.9	16.8
DMS <sup>c</sup> (≥once/week) [%]***	18.4	23.4
EMA <sup>d</sup> (≥once/week) [%]	11.9	13.4
Sleep latency (≥30min) [%]***	28.5	33.8
Irregularity of sleep (Yes) [%]	17.0	15.8
Sleepiness in the morning (≥4 days/week) [%]***	15.2	26.4
Fatigue in the morning (≥4 days/week) [%]***	17.0	28.7
Feeling heaviness in the head (≥4 days/week) [%]***	7.8	15.1
Napping (yes) [%]	35.9	35.8
Total sleep time (h)***	6.7±1.2	6.4±1.4
ESS score**	5.9±3.6	6.3±4.0
BDI score**	7.2±5.8	9.5±7.0
T-Anger scores**	18.7±5.0	17.5±5.1

<sup>a</sup> Mean±S.D.

<sup>b</sup> Difficulty in initiating sleep.

<sup>c</sup> Difficulty in maintaining sleep.

<sup>d</sup> Early morning awakening.

\*\* *P* < .01.

\*\*\* *P* < .001.

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