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Brief Communication

Impact of frequency of nightmares comorbid with insomnia on depression in Japanese rural community residents: a cross-sectional study

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ABSTRACT

Objective: Nightmares and insomnia are known to be associated with the development and aggravation of depression. Our community-based study was conducted to clarify the relation between the impacts of nightmares and insomnia on depression.
Methods: A cross-sectional questionnaire-based survey was administered to residents of a rural community in Japan. In all, 2822 participants responded to questions assessing personal characteristics, the Pittsburgh Sleep Quality Index (PSQI) for assessing insomnia, and a 12-item version of the Center for Epidemiological Studies Depression scale (CES-D) for evaluating depression. Nightmare frequency was assessed using an item for nightmares on the PSQI.
Results: Nightmares more frequently occurred in participants with insomnia than those without ($P < .01$). Multiple regression analysis revealed that the scores of both nightmares and insomnia were significantly associated with the increase in depression score (nightmares ($\beta = 0.09$, $P < .01$); insomnia ($\beta = 0.39$, $P < .01$)). Participants with coexisting nightmares and insomnia showed higher depression scores than participants with insomnia alone or those with nightmares who did not have insomnia ($P < .01$).
Conclusions: Insomnia and nightmares independently and additively impact the aggravation of depression.

1. Introduction

Nightmares are characterized by intense dreams associated with negative emotions that occur during rapid eye movement sleep, often resulting in fearful awakenings [1]. The prevalence of nightmares with clinically significant frequency of more than once a week is 2.4% to 5.1% in the general population [2,3]. A meta-analysis also revealed a substantial gender difference in the frequency of nightmares in adolescents and middle-aged adults, but no gender difference was found in children or elderly individuals [4].

Nightmares have been widely accepted as factors associated with the aggravation of depressive symptoms. Reportedly, individuals who experience frequent nightmares have more severe depressive symptoms than those who do not [2]. However, individuals with insomnia have a twofold higher risk for developing depression compared to individuals with no sleep difficulties [5]. Furthermore, individuals with insomnia had more severe depression than those without [6]. Regarding the relation between nightmares and insomnia, a previous report described that 18.3% of individuals with insomnia experienced nightmares [7] and that the frequency of nightmares was related to the severity of insomnia [8].

To date, nightmares have been accepted as a secondary symptom of psychiatric disorders, including posttraumatic stress disorder (PTSD) and depression. The two-year incidence rate of mood disorders was 15.6 times higher in participants with frequent experience of nightmares than in healthy participants in one study [2]. However, Nadorff et al. [9] reported that nightmares were related to suicidal ideation even after controlling for anxiety, depression, and PTSD.

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These previous studies demonstrated a relation between the severity of depression and insomnia or nightmares. Nevertheless, it remains unclear if nightmares and insomnia synergistically or additively affect depression when these two disorders coexist. Our study was designed to clarify the relation between the impact of nightmares and insomnia on depressive symptoms in Japanese residents of a rural community.

2. Methods

2.1. Participants and procedure

Our study was conducted as a part of the Daisen sleep health care studies, which were performed in Daisen town in Tottori prefecture, a rural area in western Japan approximately 560 km from Tokyo, to investigate the prevalence of sleep disorders including insomnia and restless legs syndrome [10]. The studies also aimed to determine the impact of the sleep disorders on daytime function [11] and the effects of the disorders during a two-year period [12,13]. The ethics committees of Tottori University approved this study. All participants provided their informed consent to participate in the investigation. The total population of Daisen was 6643 in 2004, with 5528 residents aged 20 years or older (2521 men and 3007 women). The questionnaire survey was administered from November 2005 to January 2006. With the cooperation of local public health nurses, questionnaires were delivered to all residents who were ages 20 years or older. Among the 5528 eligible participants, 2591 participants without responses and 115 participants with invalid answers were excluded from the subsequent analyses. Consequently, 2822 residents (1222 men and 1600 women; ages, 20–97 years; mean [standard deviation], 57.4 [17.7] years) were analyzed in our study.

The participants answered questions about personal information (i.e., age, gender) and provided self-rated responses to both the Pittsburgh Sleep Quality Index (PSQI) [14] and a 12-item version of the Center for Epidemiological Studies Depression scale (CES-D) [15]. The PSQI, which is used to subjective sleep disturbance during the previous month, consists of 19 self-rated questions related to sleep disturbance [14]. Our study used the Japanese version of the PSQI [14]. The cutoff point of the PSQI is set at 5.5 for the global score with 85.7% of sensitivity and 86.6% of specificity for the diagnosis of primary insomnia [14]. For the assessment of nightmares, we used a questionnaire item of PSQI related to the presence or absence of bad dreams during the previous month. This item has four response options: not during the past month, less than once a week, once or twice a week, and, three or more times a week. Participants who reported experiencing nightmares more than once a week were defined as having nightmares in our study, which is similar to that used in previous reports [2,15]. The CES-D is designed to assess the level of depressive mood during the previous week [16]. The total score of the CES-D has a range of 0 to 36 points and three categories: 0–11 points as healthy, 12–20 point as moderate, and 21–36 point as severe depression [16]. We defined participants with scores of higher than 12 points as having depression, similar to that used in previous reports [11–13].

To identify the effect of age and gender on nightmare frequency, we conducted comparison of frequency of nightmares between gender using *t* tests and comparison of age among the four groups categorized by frequency of nightmares (not during the past month, less than once a week, once or twice a week, and three or more times a week) using analysis of variance.

After excluding the nightmare item on the PSQI, the score was used to estimate the severity of insomnia in all the following analyses other than the χ^2 test. The total score of CES-D after excluding the insomnia item also was used to estimate depressive status in all the following analyses. The χ^2 tests were used to examine the difference in the relative proportion of the number of participants with nightmares among participants with or without insomnia determined by the PSQI total score. Pearson product moment correlation coefficients were calculated among scores of the CES-D, nightmare item score, total score of PSQI, age, and gender. To identify factors associated with depression, multiple regression analysis for the CES-D total score was conducted with the other variables as explanatory variables.

After investigating the respective impacts of age and gender on nightmares, the CES-D score was compared among the groups categorized by frequency of nightmares and the presence of insomnia or nightmares using analyses of covariance (ANCOVAs) with age, which was associated with frequency of nightmares and was set as a covariate to identify factors associated with the aggravation of depression. When a significant difference was found using ANCOVAs, a Bonferroni test was conducted as a post hoc analysis.

All statistical analyses were conducted using SPSS software (SPSS version 11.0J; SPSS Inc) with a level of significance set at a two-tailed α level of 5%.

3. Results

The sample comprised 1222 men (43.3%) and 1600 women (56.7%), with a mean (standard deviation) age of 57.4 (17.7) years (range, 20–97 years). The proportion of participants having insomnia and nightmares were 25.5% and 4.6%, respectively. A χ^2 test revealed that the proportion of participants who reported experiencing nightmares was significantly higher in participants with insomnia (70.7%) than in those without insomnia (29.3%) ($\chi^2_{[1]} = 122.01$; $P < .01$).

No significant gender difference was found in the score of nightmare item ($t_{[2554]} = -.325$; $P = .75$). However, analysis of variance results showed significant differences in age among groups categorized by the frequency of nightmares ($F_{[3,1290]} = 4.22$; $P < .01$). Table 1 presents a comparison of CES-D scores using ANCOVA, controlling for age among the four groups categorized by frequency of nightmares. Significant differences were found in total scores of CES-D among the four groups categorized by frequency of experiencing nightmares ($F_{[3,2508]} = 29.27$; $P < .01$; $\eta^2 = 0.05$). Post hoc analysis revealed that both the three or more times a week group or the once or twice a week group had significantly higher total CES-D scores than the not during the past month group ($P < .01$ vs three or more times a week and $P < .01$ vs once or twice a week) or the less than once a week group ($P < .01$ vs three or more times a week and $P = .01$ vs once or twice a week). However, no significant difference in the score was found between the three or more times a week group and the once or twice a week group ($P = .62$). In addition, the less than once a week group had significantly higher CES-D score than the not during the past month group ($P < .01$).

In correlation analyses for the scores of CES-D, nightmare item, PSQI, age, and gender, significant correlations were found between the total PSQI score and age ($r = 0.08$ [95% confidence interval {CI}, 0.04–0.12]; $P < .01$), the nightmare item score ($r = 0.26$ [95% CI, 0.22–0.29]; $P < .01$), and between the total CES-D score and the nightmare item score ($r = 0.32$ [95% CI, 0.29–0.36]; $P < .01$).

Multiple regression analysis revealed that the nightmare score, insomnia score, and age were significantly associated with the CES-D score ($F_{[4,2454]} = 88.32$, $R^2 = 0.13$, and adjusted $R^2 = 0.13$ [$P < .01$]; nightmare item score: $\beta = 1.13$ [95% CI, 0.81–1.48] and $\beta = 0.14$ [$P < 0.01$]; PSQI score: $\beta = 3.11$ [95% CI, 2.71–3.052] and $\beta = 0.29$ [$P < .01$]; gender (women): $\beta = -0.27$ [95% CI, −0.61 to 0.08] and