Sleep Medicine 14 (2013) 1170–1177

Contents lists available at ScienceDirect

Sleep Medicine

journal homepage: www.elsevier.com/locate/sleep

Original Article

Sleep disturbances and reduced work functioning in depressive or anxiety disorders

Josine G. van Mill [a,b,*], Nicole Vogelzangs [a], Witte J.G. Hoogendijk [b,c], Brenda W.J.H. Penninx [a,b,d,e]

[a] Department of Psychiatry and the EMGO Institute for Health and Care Research, The Netherlands
[b] NeuroCampus Amsterdam, VU University Medical Center Amsterdam, The Netherlands
[c] Department of Psychiatry, Erasmus Medical Center, Rotterdam, The Netherlands
[d] Department of Psychiatry, Leiden University Medical Center, The Netherlands
[e] Department of Psychiatry, University Medical Center Groningen, The Netherlands

ARTICLE INFO

Article history:
Received 19 December 2012
Received in revised form 19 March 2013
Accepted 1 April 2013
Available online 29 August 2013

Keywords:
Sleep
Work
Depression
Anxiety
Absenteeism
Insomnia

ABSTRACT

Objectives: We aimed to examine the associations between sleep disturbances and work functioning in an epidemiologic cohort study in subjects with or without depressive or anxiety disorders.
Methods: There were 707 subjects included in our analyses with depressive or anxiety disorders and 728 subjects without current depressive or anxiety disorders. Insomnia was defined as a score ⩾9 using the Insomnia Rating Scale. Self-reported sleep duration was categorized in short, normal, and long (⩽6, 7–9, and ⩾10 h, respectively). Work absenteeism was defined as none, short (⩽2 weeks), or long (>2 weeks). Work performance was defined as not impaired, reduced, or impaired. Logistic regression analyses were performed to examine the associations of sleep disturbances with work functioning.
Results: In subjects with psychopathology, insomnia and short sleep duration were significantly associated with impaired work performance (odds ratio [OR] for insomnia, 2.20; [95% confidence interval {CI}, 1.50–3.22]; OR for short sleep, 2.54 [95% CI, 1.66–3.88] compared to normal sleep duration). Insomnia (OR, 2.48 [95% CI, 1.67–3.69]) and short sleep duration (OR, 1.85 [95% CI, 1.23–2.78]) also were associated with long-term absenteeism. These findings remained the same after considering clinical characteristics including medication use and symptom severity.
Results: In subjects without psychopathology, no significant associations were found between insomnia and short sleep duration on work functioning after considering subthreshold depression symptoms.
Conclusions: In subjects with psychopathology, sleep disturbances were negatively associated with work functioning, independent of disorder severity and use of psychotropic medication. Further research is needed to determine if treatment of sleep disturbances in subjects with psychopathology improves work functioning.

1. Introduction

Sleep disturbances such as insomnia are suggested to have a significant impact on work functioning [1]. Individuals with insomnia more often report difficulties working or performing daily activities [2]. An earlier large study ($N = 6892$) found insomnia to be predictive of absenteeism [3]. In addition, subjects with insomnia have been found to be less productive than noninsomniacs when working [4,5]. The annual (both direct and indirect) costs of insomnia-related absence and impaired work productivity are difficult to estimate [6] but are considered to be substantial and have a large societal impact [1]. Estimations of the annual costs of insomnia in the US labor force range from $15.0 to $17.7 billion [7]. Total costs of insomnia in the United States (direct, indirect, and related costs) also have been estimated at $30–$35 billion [8].

Sleep disturbances frequently occur in the presence of psychopathology such as depressive or anxiety disorders [9]. Insomnia and fatigue are two of the symptoms that interfere most with work functioning, according to individuals with major depressive disorder ($N = 164$) [10]. Among individuals with self-reported depressive and anxiety symptoms, subjects with insomnia more frequently report decreased productivity and also more frequently report absenteeism [11]. Insomnia has been associated with absenteeism, but this association disappeared after controlling for depressive symptoms [12].

Clearly there is an association between sleep disturbances, psychopathology, and work functioning. However, not all aspects of this association have been extensively studied. For example, it is

* Corresponding author. Address: Department of Psychiatry, A.J. Ernststraat 1187, 1081 HL Amsterdam, The Netherlands. Tel.: +31 20 7884583; fax: +31 20 7885664.
E-mail address: j.mill@ggzingeest.nl (J.G. van Mill).

1389-9457/$ - see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.sleep.2013.04.016

still unknown what the role of psychopathology is in the link between sleep disturbances and work functioning, and if the associations between sleep disturbances and work functioning are the same for subjects with and subjects without psychopathology. There are various reasons to assume that differences might exist. First, sleep disturbances may reflect a partly different phenomenon in individuals with psychopathology, with sleep disturbances being an indicator of the severity of the underlying psychiatric disorder in these subjects. Second, individuals with psychopathology may have lower responsibility feelings [13], and therefore could theoretically give up earlier on work when facing sleep problems. Subjects with psychopathology also are more prone to negative thought distortions [14], possibly affecting both sleep and work functioning. Third, individuals with psychopathology are already more at risk for reduced work functioning [15], and the addition of sleep problems could simply have more impact in an already at-risk population. On the other hand, it also is possible that the addition of one extra risk factor (sleep disturbances) might not have a substantial extra impact on work functioning in subjects who already exhibit several psychopathology symptoms. Consequently, the impact of sleep disturbance therefore could be relatively larger among individuals without psychopathology.

The large socioeconomic impact of insomnia-related absenteeism and work performance [1,5] poses a clear need for research aimed at unraveling the link between sleep problems and work functioning. The aim of our study was to investigate the association between insomnia and sleep duration with absenteeism and work performance in a large sample of subjects with and without depressive and anxiety disorders, taking into account the presence and severity of psychopathology.

2. Methods

For our study, data were analyzed from the baseline assessment of the Netherlands Study of Depression and Anxiety (NESDA). NESDA is an ongoing 8-year longitudinal cohort study designed to investigate the long-term course of depressive and anxiety disorders in individuals ranging from ages 18 to 65 years. The research protocol was approved by the Ethical Committee of participating universities and all respondents provided written informed consent. NESDA respondents were recruited from three different settings, including the general population, primary healthcare, and secondary mental health care. Individuals from the general population had previously participated in the NEMESIS (Netherlands Mental Health Survey and Incidence Study) [16] or the ARIADNE (Adolescents at Risk for Anxiety and Depression) study [17]. Individuals from primary care were recruited through a three-stage screening procedure, including the Kessler-10 [18] and a short-form Composite International Diagnostic Interview (CIDI) by phone [19]. Individuals from secondary care were recruited after they were newly enrolled for anxiety or depressive disorders at one of the participating mental health clinics. Exclusion criteria for the NESDA study included not speaking Dutch, a known primary clinical diagnosis of bipolar disorder, obsessive compulsive disorder, severe addiction disorder, psychotic disorder, or organic psychiatric disorder. A more detailed description of the study's sampling procedures is provided elsewhere [20]. The final sample size of NESDA consisted of 2981 subjects (18.9% from the community, 54.0% from primary care, and 27.0% from secondary mental health care).

For the purpose of our study, we selected the 1720 currently working participants defined as having a paid job of $\geqslant$8 h per week. Subsequently, 285 individuals were excluded due to missing data on work functioning or sleep, resulting in a total sample size of 1435 subjects. Because our selection criterion was currently working individuals, subjects with longstanding absence (>6 months) were not included in our analyses. Excluded individuals (n = 285) were considerably younger (38.5 years vs 41.5 years; P < .001) and did not differ with respect to gender but more frequently had a current depressive or anxiety disorder (67.7% vs 49.3%; P < .001) than included individuals. Our final sample consisted of 511 men and 924 women with a mean age of 41.5 years.

2.1. Measurements

Between September 2004 and February 2007, participants visited one of the seven interview locations for the baseline assessment. This assessment consisted of a standardized diagnostic psychiatric interview, a medical assessment, computer tasks, and a written questionnaire, among others.

2.2. Work performance and work absenteeism

Work functioning was conceptualized by impaired work performance and absenteeism. These factors were assessed with the TiC-P (Trimbos/iMTA Questionnaire for costs associated with psychiatric illness), which contains the Health and Labor Questionnaire Short Form and has been used in other epidemiologic studies [21]. Work performance was based on (1) how many days in the past 6 months subjects had been hindered at work by health problems and (2) subjects' work efficiency rated on a 10-point scale (0–10, higher scores implied higher efficiency) on days they had been hindered by health problems.

Subsequently, as done before [15], we used the following formula to compute work performance:

$$\frac{\#\text{ days hindered} * (1 - \text{efficiency}) * \#\text{ work hours per day}}{\#\text{ work hours per week}} = \text{Work performance}$$

The outcome ranged from 0 to 26, indicating the number of inefficient work weeks in the past 6 months. A higher score indicated more impairment. Because this variable did not meet normality assumptions, we created three categories consisting of no impairment, reduced performance (>0 and <2), and impaired performance ($\geqslant$2 [highest quartile]).

Work absenteeism was computed by dividing the number of days absent in the past 6 months divided by the number of working days per week. This score resulted in the number of weeks absent from work [15]. Because this variable was not normally distributed, we created three categories (as done before [15]) which included no absenteeism (0 weeks absent in the past 6 months), short absenteeism ($\leqslant$2 weeks absent), and long-term absenteeism (>2 weeks). Work performance and absenteeism were only weakly correlated (r = 0.17; P < .001). Short-term absence could have been an indicator of more general conditions such as the flu or common cold, while long-term absenteeism might have been attributed to chronic conditions [15].

2.3. Sleep disturbances: insomnia and sleep duration

We measured both insomnia and sleep duration. Insomnia and sleep duration were part of a questionnaire that subjects filled out during baseline assessment or at home afterwards (median time log, 4 days). Insomnia was assessed with the Women's Health Initiative Insomnia Rating Scale (IRS). This scale was developed by Levine et al. [22] and consists of five questions concerning sleep in the past month. The five items address trouble falling asleep, waking up during the night, early morning awakenings, trouble getting back to sleep after waking up, and sleep quality. Scores on the first four items range from 0 (no) to 4 ($\geqslant$5 times a week), whereas the