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Utility of self-reported sleep disturbances as a marker for major depressive disorder (MDD): Findings from the World Mental Health Japan Survey 2002–2006

Shuntaro Ando [a,*], Norito Kawakami [b]
and World Mental Health Japan Survey Group

[a] Department of Neuropsychiatry, Graduate School of Medicine, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan
[b] Department of Mental Health and Psychiatric Nursing, Graduate School of Medicine, University of Tokyo, 7-3-1, Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

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ABSTRACT

Although major depressive disorder (MDD) is a serious common disease, many depressive patients seek primary care with complaints of sleep disturbances that remain undiagnosed. The purpose of this study was to investigate the utility of self-reported sleep disturbances as a marker for MDD. This study investigated the association between 12-month prevalence of self-reported sleep disturbances and MDD using data from a cross-sectional survey in Japan. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and the area under the receiver operating characteristic curve (AUC) of self-reported sleep disturbances as a marker for MDD were 58.9%, 73.4%, 6.9%, 98.1%, and 0.66, respectively. Self-reported sleep disturbances showed highest utility for the youngest group. Among four types of sleep disturbances, the problem of daytime sleepiness was most useful as a marker for MDD. Combined with at least moderate role impairment, self-reported sleep disturbances became more informative with higher specificity (99.6%) and PPV (80.0%) as a marker for MDD. Self-reported sleep disturbances cannot be a marker for MDD in isolation. Comorbid role impairment increases the probability of MDD. Clinicians should be cautious in assessments of young people who have sleep disturbances. Daytime sleepiness should be included among the questions asked when inquiring about sleep disturbances.

1. Introduction

1.1. Background

Major depressive disorder (MDD) is a common disorder and a significant public health issue. The median 12-month prevalence of MDD in 42 studies conducted in various countries was reported to be 5.3% in a recent review (Eaton et al., 2008). In addition, depressive disorders have a significant negative impact on daily functioning (World Helath Organization (WHO), 2005). WHO reported that unipolar depressive disorder was the fourth leading cause of burden to life among all diseases, accounting for 4.4% of the total Disability Adjusted Life Years (DALYs) in 2000 (WHO, 2001). It was also reported that unipolar depressive disorder will be the leading cause of DALYs by 2020 (Murray and Lopez, 1997). Furthermore, depressive disorder can be fatal: approximately 15% of people with depression commit suicide (Sadock and Sadock, 2007).

Optimal treatment for depressive disorders has been established. The possibility of recovery from MDD within 1 month approximately doubles with pharmacological treatment (Sadock and Sadock, 2007). However, many depressive patients do not receive optimal treatment (Moller et al., 2003). It was reported that the majority of depressive patients were managed not by psychiatrists but by primary care physicians (Kernick, 1997). Many depressive patients seek assistance from general practitioners rather than psychiatrists even in a country like Japan where patients are allowed to go directly to specialized doctors (Kawakami, 2007). It was reported that among those who sought any medical treatment for depression, only about half sought help from psychiatrists in Japan. However, primary care physicians usually fail to recognize 30 to 50% of depressed patients (Simon and VonKorff, 1995). It may be difficult for general practitioners to detect depressed patients because patients do not often reveal their depressed mood. A study showed that 77% of patients with depression in Japan reported only somatic symptoms as the reason for visiting the physician (Simon et al., 1999). Therefore, an effective screening test for depressive disorders in primary care settings is required.

There are three main types of depression designated by the American Psychiatric Association: MDD, dysthymic disorder, and depression not otherwise specified (NOS) (American Psychiatric Association, 1994). MDD is defined by a disturbance of mood and a loss of interest or pleasure in normal everyday activities for at least 2 weeks, accompanied by a minimum of three to four psychological and somatic symptoms. It has been reported that women have a significantly higher lifetime risk of having MDD than men (Seedat et al., 2009). Dysthymic disorder is

* Corresponding author. Tel.: +81 3 5800 9263; fax +81 3 5800 6894.
E-mail address: sandou-tky@umin.ac.jp (S. Ando).

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characterized by more chronic but less severe depression than MDD. Although a review supported that drug treatment would be a reasonable choice for dysthymia (Lima and Moncrieff, 2000), the 12-month prevalence of dysthymia was reported to be much lower (0.7%) than that of MDD (Kawakami et al., 2005). Depression NOS includes syndromes without sufficient number of symptoms or duration to meet the criteria for MDD. Those syndromes are given other names such as 'minor depressive disorder' and 'recurrent brief depressive disorder'. A review showed that there was only a small to moderate benefit of antidepressant medications and psychological treatment for minor depression (Ackermann and Williams, 2002), and another review showed that 46 to 71% of patients with minor depressive disorder achieved remission after follow-up of 1 to 6 years (Hermens et al., 2004). Therefore, this study will focus on MDD due to its higher prevalence and potential for serious morbidity.

Several attempts were made to establish markers for MDD. A study showed that a two-question case-finding approach was effective in detecting depression (Whooley et al., 1997); however, the questions were obviously phrased and would require the physician to suspect depression in the first place, which is the main issue in missed MDD ("During the past month, have you often been bothered by feeling down, depressed, or hopeless?" and "During the past month, have you often been bothered by little interest or pleasure in doing things?"). Although another study showed that the number of symptoms from a list of 12 somatic symptoms could be a useful predictor of major depression (Nakao and Yano, 2003), it might take a lot of time to perform this checklist. At the moment, there is no universal, brief and efficient marker for MDD which can alert primary care physicians to the possibility of depression.

Sleep disturbances were shown to be one of the symptoms most predictive of functional status and well-being of patients with MDD (Brody et al., 1998). The reported prevalence of sleep disturbances varies from 10 to 60%, depending on definitions of sleep disturbances and data-collection methodologies (Ohayon, 2002). The association between sleep disturbances and MDD was reported in many studies. It was observed that 41% of depressed patients reported sufficient insomnia for an additional Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV) diagnosis of insomnia (Stewart et al., 2006). A study showed that 14% of patients with persistent insomnia had concurrent depression (Ford and Kamerow, 1989), and another study reported that 11% of sleep clinic patients had major depression (DeZee et al., 2005). In addition, severity of excessive sleepiness was associated with severity of depression (Lundt, 2005). Therefore, it was suggested that sleep disturbances could be a potential marker for MDD.

There were several studies investigating the potential causal relationship between sleep disturbances and depression. While a cohort study showed that sleep complaints increased the subsequent risk of depression (Roberts et al., 2000), a review indicated that both sleep disturbances and depression were either causally related to each other and/or common causalities underlie the two diseases (Staner, 2010). It was suggested that one may precede the other, or vice versa. In addition, it was shown that sleep disturbances were the most common residual symptom of MDD, and the increased number of residual symptom was associated with higher risk of relapse of depression (Nierenberg et al., 2010). Therefore, if both disorders are investigated for long enough periods, sleep disturbances may be found to be a marker predictive of MDD, may detect concurrent MDD, or may detect a residual symptom of MDD.

There were few studies investigating the effect of age on the association between sleep disturbances and MDD. A study reported that sleep latency was the only difference in EEG parameters between healthy and depressed elderly subjects (Vitiello et al., 1990). There were several studies investigating the effect of gender on the association between sleep disturbances and MDD. A twin study showed no difference in symptoms between depressed opposite-sex twins (Middeldorp et al., 2006). On the other hand, other studies reported that depressed women had a higher prevalence of sleep disturbance than depressed men (Silverstein, 1999; Kornstein et al., 2000; Khan et al., 2002).

As far as we know, there is no study that has examined the usefulness of sleep disturbances as a marker for MDD investigating prevalence of both disorders for more than 6 months. The measures of sleep disturbances as a marker for MDD such as sensitivity and specificity have only rarely been reported. Sensitivity is defined as the probability of testing positive if the disease is truly present. Specificity is the probability of testing negative if the disease is truly absent. Those are the measures of quantifying the diagnostic ability of the test (Kalter et al., 1983; Altman and Bland, 1994c). A Japanese case–control study showed that the sensitivity and specificity of sleep disturbance as a marker for major depression were 80.0% and 86.6% (Doi et al., 2000), but this Japanese study assessed sleep disturbance only over 1 month. Another study found that the sensitivity of self-reported sleep complaints as a marker for depression was 85% and the specificity was 44% (Almeida and Pfaff, 2005); however, the subjects were limited to elderly patients who visited general practitioners, and prevalence was measured as a point prevalence.

Although sensitivity and specificity do not provide information about the probability that the test will result in a correct diagnosis, predictive values provide this information (Altman and Bland, 1994a; Brenner and Gefeller, 1997). Positive predictive value (PPV) is the probability that a subject with a positive test result actually has the disease, and negative predictive value (NPV) is the probability that a person with a negative test result does not actually have the disease. In addition, there is a single measure of the power of a diagnostic test. A summary of the performance of a test is provided by the area under the receiver operating characteristic (ROC) curve (AUC) (Altman and Bland, 1994b). The area is equivalent to the probability that a person with the disease has a higher value of the test than a person without the disease. As far as we know, estimated values of PPV, NPV, and AUC of sleep disturbances as a marker for MDD have not been reported. Therefore, research on the utility of sleep disturbances as a marker for MDD is required in which an adequately long period of prevalence is applied and estimated measures are reported.

1.2. Aims and objectives

1.2.1. Aims

The aim of this study was to investigate the utility of self-reported sleep disturbances as a marker for MDD in the general adult populations in Japan.

1.2.2. Objectives

1) To investigate the sensitivity, specificity, PPV, NPV, and AUC of 12-month prevalence of self-reported sleep disturbances as a marker for the 12-month prevalence of MDD.
2) To examine the utility of the 12-month prevalence of self-reported sleep disturbances as a marker for the 12-month prevalence of MDD in specific age and gender groups.
3) To examine the utility of specific type of self-reported sleep disturbance as a marker for MDD.

2. Methods

2.1. Study design

This study was a cross-sectional study which examined the association between 12-month prevalence of sleep disturbances and MDD. This study used the data obtained in the World Mental Health Japan Survey (WMH-J), which investigated the prevalence of mental health disorders in Japan between 2002 and 2006.

2.2. Study sample

Study samples were from the general population in Japan among those aged ≥20 years and randomly selected from voter registry of 11 communities in Japan.