

COMORBIDITY OF NON-24-HOUR SLEEP-WAKE SYNDROME AND SEASONAL AFFECTIVE DISORDER IN A YOUNG MAN: A CASE REPORT

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Abstract

Objective: Few clinical reports have described in detail the comorbidity of seasonal affective disorder (SAD) and non-24-hour sleep-wake syndrome (non-24-SW). Both SAD and non-24-SW are thought to be caused by the interplay between internal clock dysfunction and insufficient external time cues. The aim of this study is to present and discuss in detail a subtype of psychiatric comorbidity and its sleep-focused intervention.

Method: Report of a single case.

Results: The patient was a 20-year old Asian man. During adolescence, he had experienced recurrent depressive episodes in the winter, which forced him to quit high school. From his case history he appeared to meet the criteria for SAD, and his sleep-wake diary clearly indicated a typical case of non-24-SW. Treatment comprised medication and sleep hygiene strategies as well as bright light therapy for preventive purposes. This sleep-focused intervention was clinically effective in both the acute and maintenance phases.

Conclusions: Better awareness of such psychiatric comorbidity may help to increase the recognition of treatable sleep-wake schedule disruptions. Clinicians should pay more attention to the chronobiological aspect of a patient's condition since adolescence.

Key words: seasonal affective disorder, non-24-hour sleep-wake syndrome, psychiatric comorbidity, bright light therapy, melatonin

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Abbreviations: ADHD, attention deficit hyperactivity disorder; DSPS, delayed sleep phase syndrome; non-24-SW, non-24-hour sleep-wake syndrome; SAD, seasonal affective disorder; SSRI, selective serotonin reuptake inhibitors

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Introduction

Seasonal affective disorder (SAD) is a well-described form of recurrent major depression that is characterized by a range of typical and atypical depressive symptoms which occur in autumn or winter and spontaneously remit the following spring or summer (Rosenthal et al. 1984, Lurie et al. 2006, Levitan 2007). Non-24-hour sleep-wake syndrome (non-24-SW), a subtype of circadian rhythm sleep disorders, consists of a chronic steady pattern of delays in sleep onset and wake times of 1 to 2 hours every day. Patients with non-24-SW exhibit a sleep-wake pattern that free runs with a periodicity of more than 24 hours (Okawa and Uchiyama 2007). Both SAD and non-24-SW are thought

to be caused by the interplay between internal clock dysfunction and insufficient external time cues (McArthur et al. 1996).

The concept of "psychiatric comorbidity" (i.e. the coexistence of two or more psychiatric diagnoses) has become increasingly popular over the last few decades. Despite the ongoing debate concerning the classification systems of mental disorders, the popularization of this concept should certainly be regarded as a positive development (Maj 2005). As an example, clinical research has since indicated that SAD is often associated with attention deficit hyperactivity disorder (ADHD) in youngsters (Levitan et al. 1999, Levitan 2007).

Clinically, younger subjects are relatively insensitive to their depressive symptoms and behaviors.

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Therefore, when they present with difficulties, physicians' reliance for diagnosis on their subjective sleep complaints alone may lead to circadian rhythm sleep disorders such as non-24-SW being missed or diagnosed at a later stage (Lucas 1991) and thus cause a delay in starting treatment. Successful treatments for these disorders include the administration of pharmacological agents such as melatonin and antidepressants (e.g. selective serotonin reuptake inhibitors (SSRI)) and circadian phase-shifting strategies such as bright light therapy (Rosenthal et al. 1984, McArthur et al. 1996, Lurie et al. 2006, Levitan 2007, Okawa and Uchiyama 2007).

In this paper, we present a case of SAD comorbid with non-24-SW in a young man whose symptoms appeared to have been affected by seasonal environmental light conditions since adolescence. The aim of this case report is to describe, firstly, the pattern of comorbidity of SAD and non-24-SW and, secondly, to suggest, on the basis of successful treatment in the present case, a specific sleep-focused treatment strategy for acute and maintenance phases.

Case report

The patient's history was obtained from his medical records. Informed consent to use the obtained medical data for clinical research use was given by both the patient and his parents, in accordance with the Declaration of Helsinki.

The patient was a 20-year old young Asian man, originally diagnosed by a child psychiatrist as having ADHD at the age of 6 due to signs of school maladaptation, such as cutting things up with scissors and leaving the classroom during lessons. His family history showed that his paternal grandfather was an alcoholic. The patient had received methylphenidate medication throughout elementary school to enable him to keep to the school schedule. As a result of this treatment, he became able to adapt to school activities and succeeded in entering junior high school. During that period, he was able to maintain his involvement in some school activities and get through class adequately without any medical contact. However, after entering high school, he was soon bullied by his schoolmates owing to his maladaptation to new class activities. This resulted in him having depressive feelings for the first time. In the case history interview, the patient and his family confirmed that he had experienced several depressive episodes in the winter over a period of several years. Particularly, these depressive symptoms were characterized by social withdrawal, inability to study, carbohydrate cravings, and sleep-wake reversal. His parents also reported that in the summer he had often become excessively motivated to study, suggesting sub-clinical hypomania.

At the age of 20, in December, he consulted a psychiatrist (Y.A.) by himself about treating his depressive symptoms after several difficult months of being socially withdrawn. Following initial clinical examinations in the outpatient setting, he was asked to monitor his sleep-wake rhythm by keeping a sleep diary for several months. After completion, his sleep-wake diary revealed a clear non-24-hour sleep-wake rhythm

pattern (constant 25 hours) during a depressive state in the winter (see **figure 1**). Treatment comprised both medication (paroxetine 10 mg/day plus melatonin 1 mg/day at 9 pm before bedtime) and sleep hygiene strategies aimed at improving his sleep-wake disturbances. Melatonin treatment was started based on the expectation that it would produce a corrective phase advance and entrain the patient to a 24-hour day (Nakamura et al. 1997). The sleep hygiene approach consisted of sleep education for youths (e.g., avoiding bedside snacking and surfing the internet) in order to stabilize rhythmicity. We chose this treatment approach in an attempt to avoid making him think too much about his disorder, because cogitating itself could be harmful to his insomnia and create a vicious circle (Abe et al. 2012). We also advised his parents not to criticize his withdrawn manner at home, which often led to arguments. We encouraged that his other daily habits be maintained in the expectation that this would contribute to respecting his autonomy.

After the melatonin treatment (asterisk in **figure 1**), the patient's sleep-wake rhythm was reduced to nearly 24 hours and his sleep cycle stabilized. Subsequently, he succeeded in adapting to prep-school and his depressive symptoms disappeared. Despite his favorable course, the patient was still afraid that his depressive symptoms could return in winter. Therefore, we decided to administer bright light therapy for preventive purposes in this season. He sat in front of a bright light box (at a distance of 50 cm) at 5,000 lux for 2 hours in the first week and one hour in the following weeks soon after waking up in the morning. He responded well to the therapy and around 18 months after his initial visit, his symptoms had been stabilized by his medical care and his feelings of withdrawal had sufficiently abated for him to enter University.

Discussion

Based on clinical descriptions, our patient met the Rosenthal (Rosenthal et al. 1984) and DSM-IV criteria for SAD. Around the period of adolescence, the environmental factor of diminished quantity of sunlight in winter seemed to provoke both SAD and non-24-SW pathology in our patient. This may explain why the classic symptom profile seen among adults is not always seen in younger subjects (Lucas 1991, Rosenthal 1997). In particular, Rosenthal (1996) considered SAD, delayed sleep phase syndrome (DSPS), and attention deficit disorder as a triad of adolescent characteristic syndromes. In general, parents initially noted school difficulties and social withdrawal as distinct manifestations of their child's condition. If a sleep diary had also been kept in those cases, as in the present case, non-24-SW might also have been detected.

Our patient also had a clinical history of ADHD which was treated during his time at elementary school. Several studies suggest that SAD might be associated with ADHD (Levitan et al. 1999, Levitan 2007, Amons et al. 2006) since symptoms of both disorders, such as irritability and impulsive eating behavior, often overlap. These may be disorders of central underarousal coupled with a heightened sensitivity to stimuli from the physical environment (Levitan et al. 1999, Lurie et al. 2006). A

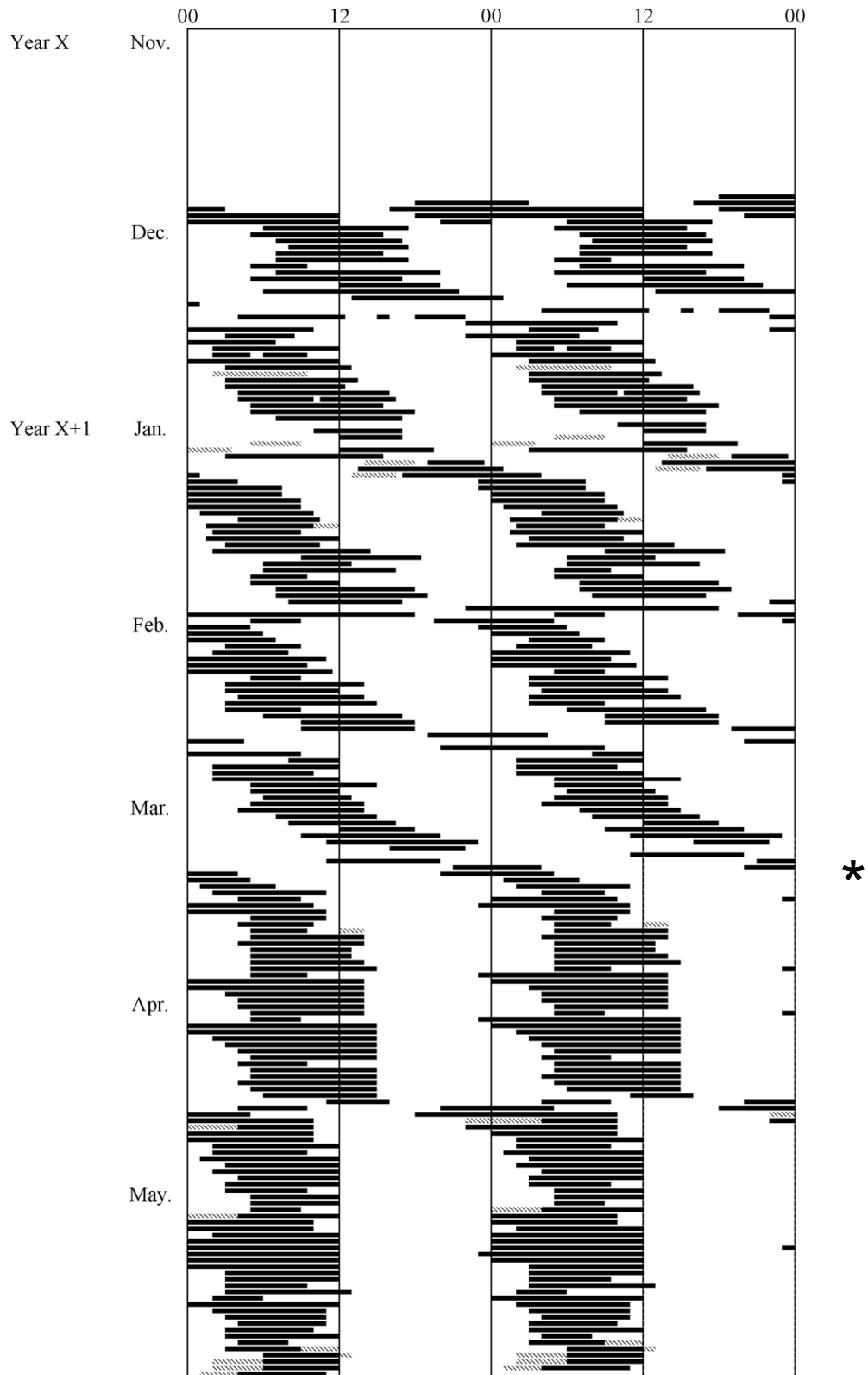


Figure 1. Double plotting of sleep-wake patterns in this case. Black bars indicate the time of sleep. The asterisk indicates the start of melatonin administration

possible explanation for this overlap may be the variation in the serotonin 5-HT_{2A} receptor gene, which is similar in both SAD and ADHD (Lurie et al. 2006, Levitan 2007).

In a 10-year Japanese cohort study of 57 sighted patients with non-24-SW, Hayakawa et al. (2005) found that other psychiatric disorders preceded the onset of non-24-SW in one quarter of their sample. Although they did not precisely evaluate seasonal patterns among various mood disorders in their patients, Okawa and Uchiyama (2007) referred to the importance of a phase relationship between mood and reduced exposure to sunlight in their work. This might be in line with the present case: our patient was 20 years of age when non-24-SW was diagnosed, but it may have emerged earlier along with adolescent winter depression.

Some SAD patients show delayed phases of biological rhythms (Lurie et al. 2006, Levitan 2007). In our patient, non-24-SW in winter appeared with his delayed bedtime and wake time, resulting in severe social withdrawal. The occurrence of non-24-SW in sighted individuals has raised questions concerning plausible pathogenic mechanisms (Kitamura et al. 2012, Mizuma et al. 1992, McArthur et al. 1996). Certain patients with non-24-SW may have an endogenous circadian period that is beyond their range of entrainment to a 24-hour cycle. Brown et al. have reported that individuals with evening type or a history of SAD had longer daily rhythms for circadian clock gene expression in fibroblast cells than individuals with morning type (Brown et al. 2008). Previously, SAD patients had been characterized as evening type (Murray et al. 2003). Given these findings, we speculate that a prolonged intrinsic circadian period might be a genetic background to the comorbidity of SAD and non-24-SW and that there might be certain trait-dependent changes (vulnerabilities) in the clock properties of individuals with SAD and a previous history ADHD treatment.

In addition, our patient might have experienced habitual insufficient exposure to day light and/or may have been sub-sensitive to social cues in his living environment since childhood. An intriguing relationship between negative life events, poor social support, and heightened seasonality was highlighted in a community sample (Michalak et al. 2003). The present case may be a typical clinical example of social impairment as the result of seasonality and irregular circadian rhythm, which causes several relationship breakdowns during adolescence. Failure to recognize this condition may lead to an accumulation of unnecessary impairments of personal, academic, and family functioning at a critical age (Lucas 1991). To date, when planning treatment for acute and maintenance phases, sleep-focused psychiatric intervention has been considered crucial for stabilizing seasonal change of mood and behavior (Wirtz-Justice et al. 2008). Rosenthal (1995) also reported the success of light therapy for an adolescent with a triadic comorbidity (SAD, DSPS, and attention deficit disorder). Since bright light therapy is the primary treatment for SAD, many young adults with a past history of ADHD and comorbid SAD might benefit from it (Amons et al. 2006, Wirtz-Justice et al. 2008, Niederhofer and Klitzing 2011).

While the concept of psychiatric comorbidity may

be considered a by-product of recent debates on diagnostic systems of mental disorders (Maj 2005), identifying certain patterns of comorbidity could lead to specific holistic treatment strategies being tried as well as preventing unwarranted polypharmacy.

Conclusion

Very few clinical reports have described in detail the comorbidity of SAD and non-24-SW. The present case indicates that clinicians should pay more attention to the chronobiological aspects of a patient's condition during late adolescence and youth. In future, better awareness of such psychiatric comorbidity may help to increase the recognition of treatable sleep-wake schedule disruptions.

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