

Outcomes of Cognitive-Behavioral Treatment for Insomnia on Insomnia, Depression, and Fatigue for Individuals with Multiple Sclerosis

A Case Series

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Background: *This clinical case series examined outcomes of cognitive-behavioral therapy for insomnia (CBT-I) in individuals with multiple sclerosis (MS). Current literature links insomnia with higher rates of depression and fatigue in individuals with MS. However, no research to date evaluates a targeted psychotherapeutic intervention for insomnia in this population.*

Participants and Methods: *Eleven individuals with a diagnosis of MS and insomnia participated in individual or group-based CBT-I sessions at the Cleveland Clinic Sleep Disorders Center between 2008 and 2013. A medical record review examined these individuals' self-reported experiences of insomnia, depression, and fatigue at the preintervention and postintervention levels using the Insomnia Severity Index, nine-item Patient Health Questionnaire, and Fatigue Severity Scale. Total sleep time was also reported at pretreatment and posttreatment intervals.*

Results: *Overall, participants reported improvements regarding insomnia, fatigue, and depression after CBT-I. Total sleep time also increased by an average of 1.5 hours. Despite overall improvement, symptoms of fatigue, insomnia, and depression persisted, at varying levels, for most participants.*

Conclusions: *These results strongly suggest that CBT-I may serve as an effective clinical intervention for individuals with MS who report symptoms of insomnia. Given the considerable overlap of experiences of insomnia, depression, and fatigue in people with MS, CBT-I may also be helpful in identifying areas that may require additional clinical intervention for persistent symptoms of depression and fatigue. Further research is necessary. Int J MS Care. 2015;17:261–267.*

Research has demonstrated that the prevalence of sleep disorders in individuals with multiple sclerosis (MS) is 30% to 56% compared with 10% to 30% in the general population or in other chronic diseases.^{1,2} However, individuals may be undiagnosed and undertreated. According to a recent survey of approximately 7700 individuals with MS, more

than half (56%) reported sleep disturbances, including insomnia.³ Of those who reported difficulties with sleep, only 25% had a medical diagnosis of insomnia or another sleep disorder. One-third of those diagnosed were untreated. Individuals with higher levels of disability reported more severe symptoms, including fatigue and daytime sleepiness. One of the most common, restless legs syndrome, is known to be approximately twice as frequent in the MS as in the non-MS population.^{4,5} Although the incidence of obstructive sleep apnea in patients with MS is unknown, initial research suggests that obstructive sleep apnea may be a highly prevalent yet underrecognized contributor to fatigue in people with MS.⁶ Rates of insomnia in this population

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also vary, ranging from 32% to 54% compared with 10% to 15% in the general population.^{1,7} Insomnia, or difficulties with initiating or maintaining sleep, is linked with deleterious effects on physical and mental health. According to the *International Classification of Sleep Disorders—Third Edition*,⁸ a diagnosis of insomnia is appropriate when a person experiences one or more of the following at least 3 nights a week for at least 3 months: dissatisfaction with sleep quantity or quality; difficulty initiating sleep; difficulty maintaining sleep, characterized by frequent awakenings or problems returning to sleep after awakenings, early morning awakening with inability to return to sleep, or nonrestorative sleep; occurrence of the sleep difficulty despite adequate age-appropriate circumstances and opportunity for sleep; and distress or daytime impact, including fatigue, cognitive impairment, mood disturbance, decreased performance at work, and negative effects on social functioning.

Spielman and Glovinsky⁹ conceptualized a person's experience of insomnia according to predisposing, precipitating, and perpetuating factors. Predisposing factors include the presence of underlying biological or emotional issues, such as being a light sleeper or prone to anxiety, which provide an increased vulnerability to developing insomnia. One or more precipitating factors, such as a loss, trauma, or medical illness, may trigger the onset of insomnia in a person. Perpetuating factors include the behaviors or attitudes that maintain one's experience with insomnia and are the target of treatment.

Similar to many other symptoms in MS, sleep difficulties may be considered primary, secondary, or tertiary symptoms of MS. Sleep difficulties may be considered primary symptoms when they result from lesions in areas of the brain that are responsible for sleep. Individuals commonly experience sleep difficulties as a secondary or tertiary symptom, resulting from other symptoms, including nocturia, spasticity, pain, mood disorders, anxiety, and medication adverse effects. In accordance with the Spielman and Glovinsky model of insomnia, these may be considered perpetuating factors for insomnia in a person with MS.

Several studies have demonstrated significant relationships among insomnia, depression, and fatigue for people with MS.^{2,10-14} In one study, depression and sleep difficulties were stronger predictors of fatigue than was disease severity.¹⁴ Individuals with MS are at increased risk for depression compared with the general population, with estimates ranging from 26% to 51%. Depression has been shown to worsen with sleep disturbances, and sleep disturbances are often exacerbated by depression.²

Fatigue is also a symptom that is significant for most people with MS and one that worsens with depression and sleep problems.^{13,15} Data suggest that individuals with MS who note fatigue should undergo appropriate evaluation to rule out a sleep disorder precipitating or perpetuating the MS-related fatigue. For example, MS-related fatigue may mask the existence of a sleep disorder, such as insomnia. Likewise, a sleep disorder may be blamed for an individual's fatigue when, in fact, the individual is experiencing fatigue and sleep difficulties. In 2004, Attarian et al.¹⁶ compared 15 individuals with MS who reported fatigue with 15 individuals with MS who did not present with fatigue. Twelve of the 15 individuals with fatigue reported disrupted sleep or disrupted circadian rhythm compared with three of the 15 without fatigue.

Studies have shown that cognitive-behavioral therapy (CBT) is an effective form of treatment for depression and fatigue in individuals with MS.^{17,18} In a study conducted by Baron et al.,¹⁷ psychotherapy that targeted depression also resulted in a reduction of insomnia for people with MS. Over 16 weeks, 127 individuals with MS participated in a telephone-based treatment program that included cognitive restructuring of depressed beliefs, increasing positive behaviors, and stress management skills. Despite the fact that this was not a CBT intervention for insomnia (CBT-I), participants reported an overall reduction in the occurrence of insomnia at the conclusion of treatment. However, half of the participants continued to endorse some level of insomnia, indicating a need for targeted treatment of insomnia beyond treatment for psychological distress.

CBT-I targets specific behaviors and thoughts related to sleep and has been shown to be a successful, cost-effective treatment for insomnia, with short- and long-term results.¹⁹ It may be conducted on an individual or group basis in an average of four to eight sessions. However, research suggests that the most critical components of CBT-I occur within the first two sessions.²⁰ Approximately 200 trials have been conducted on either single interventions or multicomponent interventions characterized as CBT-I. Results indicate that CBT-I is highly efficacious and comparable with hypnotics in the short term while demonstrating more durable effects when active treatment ends.^{21,22} Research has also demonstrated that CBT-I is linked to lower levels of depression in the general population.²³ Although there is no research that examines the use of CBT-I for individuals with MS, other studies have demonstrated its effectiveness with individuals who present with other comorbid

conditions, such as Parkinson disease, chronic pain, and fibromyalgia.^{20,24}

In accordance with the demonstrated effectiveness of CBT-I in general and medical populations and the purported success of CBT in treating depression and fatigue in people with MS, it is logical to presume that CBT-I may be an effective form of treatment for people with MS for reducing insomnia and self-reported experiences of depression and fatigue. To date, however, there is no research that examines the effects of psychotherapeutic treatment that targets sleep disorders in this population. This study served to address this void in the literature and to inform future research regarding the treatment of insomnia in this population.

Methods

Participants

A retrospective medical record review was conducted for individuals with MS who participated in at least two sessions of individual- or group-based CBT-I at the Neurological Institute's Sleep Disorders Center at the Cleveland Clinic Foundation between 2008 and 2013. A database approved by the Cleveland Clinic Foundation institutional review board was run to extract the data. The sample included 11 individuals: ten women and one man aged 36 to 69 years (mean \pm SD age = 52 \pm 11 years). Eight participants identified as white and three identified as African American. The total number of office visits ranged from 2 to 16 (mean \pm SD = 8 \pm 4.8). In terms of the classification of MS, eight patients had a relapsing-remitting (RRMS) course and three had a primary or secondary progressive type of MS.

Measurements

Insomnia was measured using the Insomnia Severity Index (ISI),²⁵ a self-report measure containing seven items that assess an individual's experience with insomnia on a 4-point Likert scale, with higher scores indicating more severe insomnia. Psychometric assessment has revealed that the ISI is a valid and reliable measure of sleep difficulties and changes in sleep difficulties after treatment.

Depression was measured using the nine-item Patient Health Questionnaire (PHQ-9),²⁶ a self-report questionnaire that assesses symptoms of depression on a 4-point Likert scale from 0 (not at all) to 3 (nearly every day), with higher scores corresponding with severity of depression. Assessment of the psychometrics of this measure indicates that it is a valid and reliable assessment of depression, with tests of internal consistency and construct and criterion validity.

Fatigue was measured using the Fatigue Severity Scale (FSS),²⁷ a nine-item self-report assessment that measures an individual's experience of fatigue on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). The validity and reliability of the FSS have been tested specifically with an MS sample compared with a control sample. Discriminant function analysis and an internal consistency analysis reveal that it is a reliable and valid assessment of fatigue for people with MS.

Total sleep time (TST), or the self-reported average number of hours an individual sleeps per night, was calculated by each individual at the beginning and end of treatment. Improvement was defined by an increase in TST and decreases in PHQ-9, FSS, and ISI scores. Worsening of symptoms was defined by a decrease in TST and increases in PHQ-9, FSS, and ISI scores.

Treatment

As with traditional CBT approaches, CBT-I comprises techniques that involve self-monitoring, behavior modifications, and cognitive restructuring. The specific CBT-I protocol used by the Sleep Disorders Center at Cleveland Clinic was developed in accordance with previous research of manualized treatments.²⁸⁻³⁰ Education regarding basic sleep hygiene, including increased exercise, eliminating televisions and computers from the bedroom, and establishing a cool, dark environment for sleep, is provided at the beginning of treatment. Sleep logs are used as a form of self-monitoring of sleep patterns. They track sleep and wake times, as well as recording other relevant habits, including napping, exercise, and medication intake. A subjective rating of sleep quality for each night may also be included.

Stimulus control and sleep restriction are the core behavior components in CBT-I. For many with insomnia, the bed and the bedroom become linked with wakefulness and arousal, and often also with negative emotions. In these cases, the bed becomes the cue for arousal rather than sleep. Stimulus control is a set of instructions that address conditioned arousal. Each component is designed to strengthen the bed as a cue for sleep and weaken it as a cue for wakefulness by training the individual to associate the bed and bedroom with sleep.

The components of stimulus control are establishing a regular morning rise time, going to bed only when sleepy, getting out of bed if not sleeping, and avoiding napping. Maintaining a consistent wake time helps strengthen the circadian clock regulating sleep and wakefulness. Going to bed only when sleepy and getting out of bed if not sleeping increases the probability that one will fall asleep quickly once in bed, reducing the frustra-

tion of spending considerable time awake in bed and strengthening the association between being in bed and achieving sleep. Naps longer than 30 minutes and those taken late in the evening can be especially disruptive to sleep. However, a brief nap (15 to 30 minutes) taken approximately 7 to 8 hours after rise time can be refreshing and is not likely to disturb nocturnal sleep.

Once an individual has completed a sleep log for at least 1 week, the clinician develops a sleep restriction plan to limit the time spent in bed to the actual average sleep time. An individual's current sleep efficiency is calculated using the average TST and average time spent in bed. For example, a person may follow a schedule of going to bed at 10:00 p.m. and waking up at 6:00 a.m. with 3 hours of awake time due to delayed sleep onset and awakenings in the middle of the night. This person's sleep efficiency would be 63% based on an average TST of 5 hours and 8 hours of time in bed. A proposed sleep restriction plan would be for this person to go to bed no earlier than 12:30 a.m. and awaken at 6:00 a.m. It is often necessary to work with individuals to identify relaxing, nonengaging activities that will allow them to stay up later and stay out of bed until the recommended time or until they are sleepy. The goal is to improve the quality of a person's sleep by increasing the sleep drive. A strong sleep drive will reduce wakefulness and lead to a better quality of sleep. Over time, as sleep quality improves, time in bed will be extended.

Cognitive restructuring focuses on catastrophic thinking and the belief that poor sleep will have devastating consequences. People with insomnia tend to have negative thoughts and beliefs about their condition and its consequences. Challenging these beliefs can decrease the anxiety and arousal associated with insomnia. These beliefs are challenged with evidence collected by the individual of how rarely, or ever, the feared consequences have occurred. The result is increased self-awareness that cognitive arousal, or fearful anticipation, is a contributing factor to perpetuating insomnia while also empowering the individual to be able to engage in more positive and realistic beliefs regarding sleep.

Relaxation is incorporated to reduce or eliminate sleep-

disruptive physiological and cognitive arousal. Instructions and modeling of relaxation techniques, including progressive muscle relaxation, diaphragmatic breathing, visualization, self-hypnosis, meditation, and biofeedback, may be used during the course of CBT-I. Through the practice of daily relaxation techniques, individuals learn to interrupt the automatic stress response and achieve a more relaxed mental and physical state that is more conducive to achieving sleep.

Results

Overall, participants reported improvement across all domains (Figure 1). Select individuals reported improvement regarding some symptoms, but with no change in or worsening of others. For example, despite a reduction in the severity of insomnia and depression, one individual reported a worsening of fatigue. Another reported a reduction in fatigue but worsening of depression and an increase in TST. According to this medical record review, no adverse incidents or adverse effects were reported as a result of participation in CBT-I.

Insomnia

The average ISI score for participants before CBT-I was 21. Most individuals (86%) reported improvement regarding their insomnia, with an average ISI score of 17 after treatment. Forty-three percent of patients reported a reduction in the overall severity of insomnia. However, note that scores were recorded for only 7 of the 11 participants because the ISI was not used by the Sleep Disorders Center until 2010. Two individuals had a progressive type of MS, and the remaining five had RRMS. Both individuals with progressive MS reported

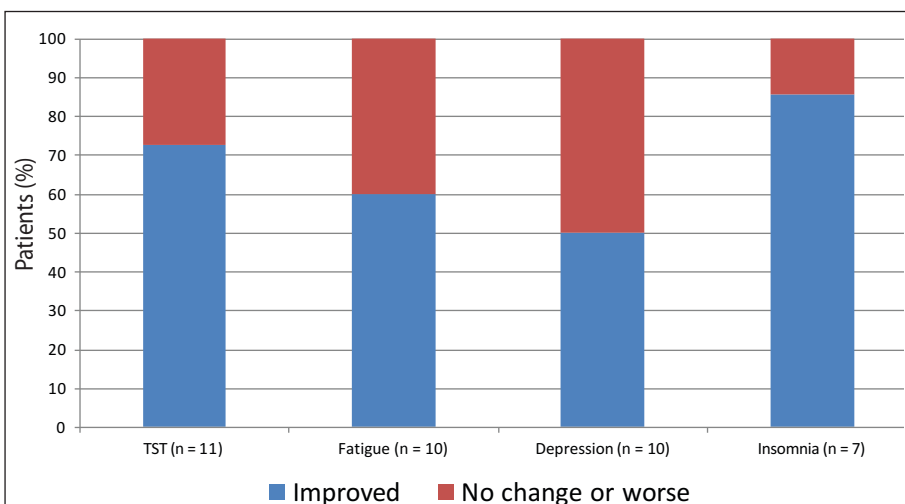


Figure 1. Cognitive-behavioral therapy for insomnia outcomes

TST, total sleep time.

improvement. Four of the five patients with RRMS reported improvement.

Depression

Before treatment, the average PHQ-9 score was 14. Half of the participants reported improvement regarding depression, with a posttreatment average score of 12. Moreover, these individuals also reported an overall decrease in severity of their depression. Scores at the pretreatment and posttreatment intervals were recorded for only 10 of the 11 participants. Of the five individuals who reported reduced depression, two had a progressive type of MS and three had RRMS.

Fatigue

The average FSS score before treatment was 53. A large proportion of participants (60%) reported a reduction in fatigue, with an average posttreatment score of 51. However, all individuals continued to endorse a clinical level of fatigue as measured by the FSS, which divides fatigue into nonclinical (0–36) and clinical (36+) levels of fatigue. Scores at the pretreatment and posttreatment intervals were recorded for only 10 of the 11 participants. Of the six individuals who reported a reduction in their fatigue, one had progressive MS and the remaining five had RRMS.

Total Sleep Time

Most individuals (73%) reported an increase in TST, with an average improvement of 1.5 hours. Before CBT-I, the average reported TST was 5.5 hours compared with 7 hours after treatment. The TST was recorded for all the participants at the pretreatment and posttreatment intervals. Two patients with progressive MS and six with RRMS reported an increase in TST.

Discussion

The results of this medical record review indicate that CBT-I, either on its own or in conjunction with other forms of treatment, including the use of sleep medication, may be an effective, targeted intervention for people with MS who experience insomnia. In addition, the data suggest that CBT-I may also be effective in reducing self-reported experiences of depression and fatigue. Moreover, CBT-I may be helpful in determining whether there is a need for additional clinical interventions for patients. For example, although participants reported improvement of fatigue in many cases, all the patients continued to endorse clinical levels of fatigue. In another instance, despite a reduction in the severity of insomnia and depression, one patient reported a worsening of fatigue. Another patient reported a reduction in fatigue but worsening of depression and an increase in TST. In

these cases, it seems that CBT-I may have contributed to the relief of certain symptoms while highlighting areas that may warrant further treatment, including behavioral and pharmacologic treatments for depression as well as fatigue management.

Although the CBT-I treatment examined in this study was not tailored to individuals with MS, it is worth discussing potential considerations or modifications when using CBT-I in this population. For people with MS, it will be important to consider physical or motor limitations; they may need assistance in completing sleep logs. Cognitive impairments with MS may also serve as a barrier and warrant support and involvement from a partner or caregiver. Owing to high levels of fatigue, longer naps may be necessary for individuals with MS. Waiting until a person feels sleepy to get into bed may not be realistic for individuals who rely on others for assistance with getting into bed because some individuals may need to accommodate the schedule of a caregiver or aide. Getting in and out of bed if having difficulty falling or staying asleep may not be feasible due to physical limitations. Working with individuals to make adjustments such as changing a position in bed or the environment of their bedroom (eg, turning on lights) in these instances may be a proposed modification. For individuals who are not able to restrict their time in bed to when they are sleeping, a sleep *compression* plan that will allow for more time in bed may be preferable to sleep restriction in some cases. Finally, progressive muscle relaxation that includes tensing of muscles may not be an appropriate form of relaxation owing to spasticity,

PracticePoints

- The incidence of sleep disorders in individuals with MS is three to five times higher than that in the general population. Sleep problems in individuals with MS are underdiagnosed and undertreated, and they are often misunderstood as fatigue—the most common and disabling symptom of MS.
- Cognitive-behavioral therapy for insomnia (CBT-I) may be an effective clinical intervention for individuals with MS who report symptoms of insomnia. Also, CBT-I may help reduce symptoms of fatigue and depression. Further research is warranted.
- Clinicians should consider appropriate modifications to CBT-I based on the patient's level of disability and other comorbid disorders.

a common symptom of MS in which individuals experience increased muscle tone, or stiffness, and involuntary muscle spasms that can be painful. A separate case study has been included as Appendix 1 to illustrate how specific modifications may be used for individuals with MS.

This study has several limitations. Owing to the small sample size, the results cannot be generalized to all individuals with MS. Although this sample included individuals with RRMS and progressive types of MS, the small sample size and uneven group distribution did not allow for a meaningful comparison between these two groups' responses to CBT-I. In addition, this study does not account for comorbid sleep disorders, such as obstructive sleep apnea, or other physical or mental conditions that may interfere with initiating or maintaining sleep. It also does not account for other forms of simultaneous treatment, such as psychotherapy or the use of prescription medication for sleep. Moreover, data points were not obtained on all measures for all participants, and treatment compliance was not assessed throughout or after treatment. The small sample size also precludes the analysis of outcomes for individuals based on number of sessions or format (individual vs. group) of the intervention. Owing to the lack of a control group, these results may also reflect regression to the mean and placebo effects.

Conclusion

Despite the lack of a rigorous control setting and statistical analysis, this medical record review suggests the potential success of CBT-I in a real-world community setting without strict inclusion criteria or incentives for participation. It is the intention of these authors that this case series serve as a starting point for further examination and utility of CBT-I in this population. Further research, particularly with larger sample sizes, is needed to further assess the effectiveness of CBT-I for individuals with MS. □

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Appendix 1: Case study

We will consider the case of a 71-year-old African American woman who was diagnosed as having primary progressive multiple sclerosis (MS) when she was 39 years old. She has limited mobility in her lower limbs and is reliant on a wheelchair. She has been diagnosed as having mild cognitive impairment and depression, subsequent to MS. She requires detailed instructions and frequent reminders regarding her care and treatment and medication regimen. She lives with her husband, who attends all medical and psychology appointments. The patient presented to a health psychology visit with concerns about insomnia involving both sleep onset and maintenance difficulties for the past year. The patient can provide an overview of her sleep difficulties as well as the distress they are causing in her daily life, with increased fatigue, depression, and irritability. Her husband and primary caregiver provided further details and historical information regarding her sleep patterns. She takes frequent naps during the day. She is placed in bed by a home health-care worker at 9:00 p.m. She may fall asleep for 1 hour and then awaken for several hours before falling back to sleep. When she is unable to sleep, she watches television in bed. Although the home health-care worker arrives in the early morning, she chooses to stay in bed and sleep through the morning before being taken out of the bed around 12:00 or 1:00 p.m.

In working with this patient, it was important to involve her husband in the treatment to ensure accurate understanding and implementation of treatment recommendations owing to her cognitive disabilities, particularly regarding short-term memory loss. Given the

scheduling needs of the home health-care worker who places the patient in bed, it is unrealistic to expect her to wait until she is sleepy before getting into bed at night. Likewise, her physical limitations do not allow her to get in and out of bed if not sleeping. Therefore, it was necessary to explore alternatives such as changing her position or keeping lights on when first in bed. Because television may be a form of relaxation and an activity that may help the patient to stay awake longer, the traditional rule of eliminating the television in the bedroom was not applicable in this particular case.

The patient and her husband were able to work with her therapist to identify areas of potential change in rituals and schedule around sleep. Sleep compression, rather than sleep restriction, was used. Although the time she got into bed was not adjustable, the focus of therapy was on maintaining an environment and activity level that would delay the time she would attempt to fall asleep. Using television and crossword puzzles and delaying certain sedating medications, such as gabapentin and baclofen, until a later time aimed to build the sleep drive and facilitate more condensed sleep. An earlier, consistent wake time was established so that she spent less time in bed in the morning, which cut down on morning and daytime napping. The result was an increase in sleep drive, which helped with the initial onset of sleep at night as well as more consolidated sleep with fewer awakenings during the night. As this case illustrates, it is critical to work with individuals and their caregivers to accommodate specific circumstances and limitations to maximize the benefit of this targeted intervention for insomnia.



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The Consortium of Multiple Sclerosis Centers (CMSC) presents an annual award, the Herndon Award for Outstanding IJMSC Article, for the best article published in the *International Journal of MS Care* during a given calendar year. The award carries a \$1000 stipend. Robert M. Herndon was the founding editor of IJMSC. The winner of the 2015 award will be announced at the 2016 Annual Meeting of the CMSC in June.