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Johanna F. Detwiler

*Philadelphia College of Osteopathic Medicine*

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# **Is Mindfulness-Based Therapy Effective In Increasing Total Sleep Time In Adults?**

Johanna F. Detwiler, PA-S

A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

The Degree of Master of Science

In

Health Sciences – Physician Assistant

Department of Physician Assistant Studies  
Philadelphia College of Osteopathic Medicine  
Philadelphia, Pennsylvania

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## Abstract

**Objective:** The objective of this selective evidence based medicine review is to determine whether or not mindfulness-based therapy is effective in increasing total sleep time in adults.

**Study design:** Review of three randomized controlled trials published in 2011, 2014 and 2015, all English language.

**Data source-**The three randomized controlled trials that were used in this review were found using PubMed.

**Outcomes measured:** Total sleep time, sleep onset latency, wake after sleep onset, number of awakenings, time in bed, subjective sleep quality, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction were the main outcomes measured.

**Results:** In the Black *et al.* study there showed an improvement in the mindful awareness practice group by a mean of 2.8 and a mean of 1.1 in the sleep hygiene education group when comparing Pittsburgh Sleep Index Quotient (PSQI) scores which includes total sleep time from baseline to post intervention. The Gross *et al.* study showed a baseline mean of total sleep time of 6.34 hours in the mindfulness-based stress reduction group was reduced to 6.21 hours and in the pharmacotherapy group a baseline total sleep time of 6.40 hours increased to 6.95 hours at the end of active treatment. The Ong *et al.* study showed an increase in the total sleep time of 27.68 minutes in the mindfulness-based stress reduction group and the mindfulness-based therapy for insomnia group showed an increase of 2.5 minutes along with the self-monitoring group that had an increase of 6.53 minutes in the total sleep time.

**Conclusion:** Mindfulness-based therapy (MBT) has not been shown to be as effective in increasing total sleep time as pharmacotherapy in the short term, but was shown to increase total sleep time when compared to sleep hygiene education or self-monitoring. MBT can be used as an adjunctive therapy for those that suffer from insomnia and may be more efficacious when used long term.

**Key Words:** Insomnia; Mindfulness; Sleep

## Introduction

Insomnia is characterized as persistent difficulty falling or staying asleep with concomitant waking dysfunction that can contribute to the development or worsening of chronic medical conditions.<sup>1</sup> According to the National Institutes of Health approximately 30 percent of the general population complain of sleep disruption and six percent are diagnosed with chronic insomnia.<sup>2</sup> Insomnia can lead to health consequences including suffering from common illnesses more often because people with a lack of sleep have a weakened immune system and daytime sleepiness that has been linked to an increase in car accidents.<sup>3</sup> Insomnia is also linked to more concerning health conditions such as heart disease, heart attack, heart failure, irregular heartbeat, high blood pressure, stroke and diabetes.<sup>4</sup>

Some causes of insomnia include stress, when people worry too much about work, finances or family obligations it can make falling asleep a challenge. People that travel for work or have an alternating work schedule can put them at risk of developing insomnia. Poor sleep habits have become an increasingly concerning issue, with people using their cell phones or watching television while trying to go to sleep can lead to sleep disturbances. There are some medications and medical conditions that can contribute to sleep disturbances as well, specifically acid reflux can prevent a restful night's sleep.

Mindfulness based therapy is defined as the awareness that emerges through paying attention on purpose, in the present moment without judgement and acknowledging things as they are.<sup>5</sup> Mindfulness based therapy has been used to treat many different mental health disorders including depression and post-traumatic stress disorder. Mindfulness based therapy is used to calm the brain's thoughts and allow it to relax and potentially help people with insomnia

get better sleep. Using mindfulness based therapy can help with those that suffer from insomnia caused by stress, poor sleep habits and alternating work schedules.

The costs for direct treatment of insomnia can range from \$30-35 billion per year.<sup>6</sup> In 2010, there were a reported 5.5 million health care visits relating to a sleep disturbance. Insomnia and other sleep disturbances is a condition that affects a large portion of the population both directly and indirectly. When someone does seek medical assistance for their sleep disturbances the usual method for treatment is a prescription for sleeping medications which can range from benzodiazepines to Ambien, these medications have side effects that affect each person differently and there is potential for the patient to become dependent on the medication for restful sleep. Sleep medications can also be expensive and do not provide a long-term treatment for insomnia. Mindfulness based therapy is being proposed to assist with insomnia treatment because it is inexpensive, has no side effects from chemicals being used and can provide a long-term treatment option.

### Objective

The objective of this selective EBM review is to determine whether or not mindfulness-based therapy is effective in increasing total sleep time in adults.

### Methods

The studies included in this review consist of three randomized controlled trials. The criteria used to select these studies depended on the target population, interventions used and outcomes that were measured. The population was limited to individuals over the age of 18 with chronic sleep dysfunctions not attributed to other medical conditions. The intervention of interest used was mindfulness-based therapy and was compared to some other forms of insomnia treatments. The comparison groups included in these studies were sleep hygiene education, self-

monitoring condition and pharmacotherapy (eszopiclone-Lunesta). The outcomes measured compared each comparison group based on total sleep time (TST), sleep onset latency, wake after sleep onset, number of awakenings, time in bed, subjective sleep quality, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, daytime dysfunction.

The sources used for this selective review came from a search of medical databases looking for English language articles with the key words insomnia, mindfulness and sleep. The articles were selected based on the relevance to the clinical question and if they included patient oriented outcomes that matter (POEMs). The search was done via PubMed search engine using the key words listed. The articles chosen were published in scientific journals. Inclusion criteria for selection of the articles included randomized, controlled trials published after 2011.

Exclusion criteria used for article selection included articles that were published more than 10 years ago, patients that were under 18 years old, patients with a medical condition that could cause a sleep disorder or had uncontrolled psychiatric conditions and unpublished data. The statistics that were used in these articles were p-values.

Study	Type	# Pts	Age	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Black, 2015	RCT	49	>55	Older adults (>55 y/o) with an active sleep disturbance	Current smoker, substance dependence, inability to speak English, depression cognitive impairment, significant/ current practice of meditation, obesity, current inflammatory d/o, sleep apnea, restless leg syndrome, illness or infection in the past two weeks	6	Mindful awareness practices, sleep hygiene education
Gross, 2011	RCT	30	18-65	Adults age 18-65, ability to read and speak English, with a diagnosis of primary chronic insomnia	Persons with medical conditions, mental disorders, or different sleep disorders suspected of being directly related to the insomnia	2	Mindfulness-based stress reduction, eszopiclone (Lunesta)

Ong, 2014	RCT	54	>21	Adults >21 y/o who met diagnostic criteria for an insomnia disorder with at least one symptom of an associated daytime disorder	Uncontrolled medical condition suspected to interfere with sleep, uncontrolled psychiatric condition, comorbid sleep d/o, use of hypnotic or sedating medications, inadequate proficiency in English	3	Mindfulness-based therapy for insomnia, mindfulness-based stress reduction, self-monitoring condition
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Table 1-Demographics and Characteristics of included studies

Outcomes measured

The Black *et al* article measured the outcomes using the Pittsburgh Sleep Quality Index (PSQI), which consists of a 19-item self-report questionnaire that includes questions about total sleep time, bed time, sleep quality, along with other questions to rule out other causes of sleep dysfunction. The PSQI questionnaire was used pre and post intervention, which was a 10 week interval to evaluate the effectiveness of the interventions.<sup>7</sup> There were secondary outcomes assessed as well such as symptoms of stress, fatigue, depression and anxiety.

The Gross *et al* article used sleep diaries that included total sleep time, sleep onset latency, wake after sleep onset and sleep efficiency (sleep time divided by time in bed), Insomnia Severity Index (ISI), which is a seven-item questionnaire that evaluates the patient’s threshold of concern about their current insomnia symptoms and how it affects the patient’s life. The PSQI questionnaire was also used. These questionnaires were administered pretreatment, eight weeks post treatment and five months post treatment.<sup>8</sup> Secondary outcomes that were measured were anxiety, depression, health-related quality of life and activity limitation.

The Ong *et al* article also used sleep diaries that assessed patient reported sleep onset latency, wake after sleep onset, number of awakenings, total sleep time, time in bed and sleep efficiency. The Pre-Sleep Arousal Scale (PSAS) was used, which is a 16-item self-report questionnaire that assesses the severity of symptoms that affect falling asleep. The sleep diaries and PSAS were completed at baseline, each week for eight weeks, three and six months post

treatment.<sup>1</sup> The ISI was also used as an outcome measurement and evaluated at baseline, three months and six months post treatment. The articles used in this systematic review included POEMs, specifically patient reported total sleep time was used to evaluate the effectiveness of mindfulness-based therapy compared to other sleep dysfunction treatments.

## Results

The Black *et al* article included 49 participants, 24 were randomized into the Mindfulness Awareness Practices (MAPs) group and 25 participants were randomized into the Sleep Hygiene Education (SHE) group. The MAPs group received a weekly 2-hour, 6-session group based course in mindfulness meditation that included exercises in mindful sitting meditation, mindful eating, appreciation meditation, mindful walking and movement. The SHE group also received a weekly 2-hour, 6-session group based course on sleep hygiene. The course taught the participants about sleep biology, characteristics of healthy and unhealthy sleep, sleep problems, stress reduction and self-monitoring of sleep behavior.

Each participant was given the PSQI questionnaire at baseline and the scores were averaged, the score was out of 21 points, the results are listed in Table 2. The baseline average score was 10.2 for all participants. The participants were then given the questionnaire 10 weeks later, the PSQI score was averaged in each group. The MAPs group showed a 2.8 decrease in the PSQI score, which shows that this groups self-reported sleep concerns have reduced in that 10-week time. The SHE group also had a decrease in their PSQI score of 1.1 points, but not as significant of a change as the MAPs group.

Table 2. Black *et al*. PSQI score difference in MAPs vs SHE groups

PSQI score (0-21)	Baseline	Post Intervention	Difference	95% CI
Mindfulness Awareness Practices (MAPs)	10.2	7.4 (P<0.05)	2.8	1.8 (0.6 to 2.9) between group mean difference
Sleep Hygiene Education (SHE)	10.2	9.1 (P<0.09)	1.1	



The Gross *et al.* article had 30 participants that were randomized 2:1 into the Mindfulness-Based Stress Reduction (MBSR) group and the Pharmacotherapy (PCT) group. The 20 participants in the MBSR group received eight weekly 2.5 hour classes and a six-hour retreat. The meditation techniques presented were body scan, standing, sitting and walking meditation along with gentle hatha yoga, which involves stretching exercises. The pharmacotherapy group was given 3mg of eszopiclone (Lunesta) nightly for eight weeks, followed by an as needed basis for three months. Both groups received a 10-minute presentation about sleep hygiene. The participants kept sleep diaries for 14 days prior to the interventions and then for the last two weeks of the intervention period. The results of this study are listed in Table 3.

The baseline total sleep time for the MBSR group was 6.31 hours per night using the patient’s sleep diaries. The total sleep time increased by 0.20 hours post intervention with an increase of 0.56 hours from the baseline at the five month follow up in the MBSR group. The PCT group had an average of 6.18 hours per night at baseline and increased by 0.60 hours post intervention and 0.75 hours at the five month follow up. The results from this study show that pharmacotherapy is more effective than mindfulness-based stress reduction therapy for increasing total sleep time over these time frames.

Table 3. Gross *et al.* Total Sleep Time (TST) difference in MBSR vs PCT groups

Total sleep time (hours)	Baseline	Post Intervention 95% CI	Five months 95% CI
Mindfulness-based Stress Reduction (MBSR)	6.31	+0.20 (-0.22 to 0.63)	+0.56 (0.17 to 0.95)
Pharmacotherapy (PCT)	6.18	+0.60 (0.16 to 1.04)	+0.75 (0.04 to 1.46)

The Ong *et al* article evaluated 54 participants that were randomized into three different groups, 19 participants were allocated to the Mindfulness-Based Stress Reduction (MBSR) group, 19 participants were allocated to the Mindfulness-Based Therapy for Insomnia (MBTI)

group and the remaining 16 were placed in the Self-Monitoring (SM) group. The MBSR group received eight-2.5 hour weekly group meetings and one-six hour meditation retreat. The meetings discussed meditation practices of breathing, body scan and walking meditation techniques. The MBTI group met weekly for eight weeks and participated in formal mindfulness meditations at these sessions along with one movement meditation followed by a period of discussion about insomnia and challenges in maintaining a meditation practice. The MBTI group received specific behavioral strategies for insomnia, unlike the MBSR group. Both the MBSR and MBTI groups were instructed to practice meditation at home for 30-45 mins more than six days a week and to keep a meditation and sleep diary. The SM group were instructed to keep a daily sleep diary and took a weekly PSAS questionnaire. The results from the study can be found in Table 4.

The averaged baseline total sleep time for the MBSR group was 366.38 minutes and at eight weeks post intervention the total sleep time had increased by 27.68 minutes to 394.06 minutes. The baseline total sleep time for MBTI was 376.81 and at post intervention had increased by 2.5 minutes to 379.31 minutes. The baseline total sleep time for the SM group increased from 358.29 minutes at baseline to 364.82 minutes. The MBSR and MBTI groups were both followed up in 3 and 6 month periods, the SM group was not. The 3 and 6-month follow ups for the MBSR group showed an increase in total sleep time of 38.8 and 42.54 minutes respectively. The MBTI group showed an increase of 22.22 and 24.92 minutes during the 3 and 6-month follow up evaluations. The results of this study show the MBSR group showed the greatest increase in total sleep time, but all of the groups had an overall increase in total sleep time during this study time period. The follow up results at 3 and 6 months show that

mindfulness-based therapy has a more long term benefit and not as effective as a short term therapy.

Table 4. Ong *et al.* Total Sleep time difference in MBSR vs MBTI vs SM groups

Total sleep time (minutes)	Baseline	Post Intervention	Difference	3 month follow up	6 month follow up
Mindfulness-based stress reduction (MBSR)	366.38	394.06	+27.68	405.18 (+38.8)	408.92 (+42.54)
Mindfulness-based therapy for insomnia (MBTI)	376.81	379.31	+2.5	399.03 (+22.22)	401.73 (+24.92)
Self-monitoring (SM)	358.29	364.82	+6.53	-	-

### Discussion

The efficacy of using mindfulness-based therapy to increase total sleep time in adults with sleep dysfunction was analyzed in these three articles. After reviewing the results as presented above there seems to be an overall impact on increasing total sleep time using mindfulness-based therapy, but when compared to pharmacotherapy in the Gross *et al* article the sleeping medication increased the TST more than the mindfulness-based therapy group. The Ong *et al* article showed that the mindfulness based therapy groups both showed increase in TST over a longer-term evaluation. This data suggests that if there are similar studies performed the study should be for a longer time frame, mindfulness-based therapy seems to be more effective the longer the patient uses it. These studies also only included a small amount of participants, the data is less reliable because of the small number of participants that were evaluated. Blinding was also another issue that these articles dealt with because of the nature of mindfulness-based therapy it was difficult to keep the study blind. The follow up was also a difficult task discussed in each of these articles, the authors of the articles had difficult time receiving the data from the participants.

During review of these articles there was no mention of any safety concerns that were reported while using mindfulness-based therapies. Mindfulness-based therapy can take up quite a bit of time during the week in order to be useful, so this may be a draw back to those using this as a treatment for insomnia rather than a medication. A study done on using pharmacotherapy along with mindfulness to increase total sleep time would be recommended to see how much more beneficial using both would be.

### Conclusion

Mindfulness-based therapy showed an increase in total sleep time in adults when compared to self-monitoring or sleep hygiene education, but not when compared to sleeping medications according the articles that were reviewed. There were only three articles reviewed in this systematic review and in future reviews more studies should be included. There also should be more studies performed on this topic as there were few to choose from when doing the search for this topic. In future studies the curriculum should be included in the study to show exactly what kind of mindfulness-based therapy the patients were given. A future study is warranted to analyze the short term versus the long-term effects of sleeping medications, including the efficacy of each.