CLINICAL REVIEW

Cognitive behavioral therapy in persons with comorbid insomnia: A meta-analysis

Jeanne M. Geiger-Brown [a, *], Valerie E. Rogers [a], Wen Liu [a], Emilie M. Ludeman [b], Katherine D. Downton [b], Montserrat Diaz-Abad [c]

[a] University of Maryland School of Nursing, Department of Family and Community Health, Baltimore, MD, United States
[b] University of Maryland Health Sciences and Human Services Library, Baltimore, MD, United States
[c] University of Maryland School of Medicine, Division of Pulmonary and Critical Care Medicine, Baltimore, MD, United States

SUMMARY

Cognitive behavioral therapy for insomnia (CBT-I) is effective for treatment of primary insomnia. There has been no synthesis of studies quantifying this effect on insomnia comorbid with medical and psychiatric disorders using rigorous selection criteria. The objective of this study was to quantify the effect of CBT-I in studies including patients with medical or psychiatric disorders. Studies were identified from 1985 through February 2014 using multiple databases and bibliography searches. Inclusion was limited to randomized controlled trials of CBT-I in adult patients with insomnia diagnosed using standardized criteria, who additionally had a comorbid medical or psychiatric condition. Twenty-three studies including 1379 patients met inclusion criteria. Based on weighted mean differences, CBT-I improved subjective sleep quality post-treatment, with large treatment effects for the insomnia severity index and Pittsburgh sleep quality index. Sleep diaries showed a 20 min reduction in sleep onset latency and wake after sleep onset, 17 min improvement in total sleep time, and 9% improvement in sleep efficiency post-treatment, similar to findings of meta-analyses of CBT-I in older adults. Treatment effects were durable up to 18 mo. Results of actigraphy were similar to but of smaller magnitude than subjective measures. CBT-I is an effective, durable treatment for comorbid insomnia.

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Introduction

Insomnia is the most common sleep complaint, with 10 to 15% of adults reporting symptoms of insomnia, and 6 to 10% meeting criteria for insomnia disorder [1—5]. Among individuals with chronic medical or psychiatric disorders, insomnia is even more common [6], and may impede recovery from the disorder [7]. Studies of patients with medical disorders such as cancer, osteoarthritis, chronic obstructive pulmonary disease, chronic pain syndromes and others, demonstrate a prevalence of insomnia ranging from 19 to 64% [8—12]. The prevalence of insomnia in individuals with psychiatric disorders such as anxiety, depression, substance abuse and others is even higher, ranging from 32 to 93% [13—17].

Traditionally, insomnia associated with another medical or psychiatric disorder was assumed to be secondary to, or caused by symptoms of that disorder (i.e., secondary insomnia). In patients with conditions such as pain, cancer or depression, treatment focused on relieving the primary disorder. Lichstein [18] argued that once a provider considered insomnia symptoms to be secondary to a primary medical or psychiatric disorder, he would be reluctant to expend resources to treat the insomnia and underscored that this approach to treatment results in delayed or denial of treatment for insomnia symptoms. He stated that although secondary insomnia does exist, it is relatively rare and is usually treated with hypnotics in primary care settings. Diagnostically, secondary insomnia is more likely when variations in the severity of the primary disorder are directly reflected in variations in insomnia symptoms [19]. Once insomnia symptoms become self-sustaining the diagnosis more correctly becomes comorbid insomnia.

As a result of the need to distinguish between secondary insomnia and comorbid insomnia, the National Institutes of Health convened a state of the science conference on chronic insomnia in adults in 2005 [20—22] and endorsed 'comorbid insomnia' as an official diagnostic term separate from secondary insomnia. The requirement to differentiate between primary and secondary insomnia is no longer a part of the diagnostic nosology. The diagnostic criteria for insomnia in the Diagnostic and statistical manual of mental disorders (DSM) changed from the DSM-IV, Text Revision

* Corresponding author. University of Maryland School of Nursing, 655 W. Lombard St, Baltimore, MD 21201, United States. Fax: +1 410 706 0253.
E-mail address: jgeiger@son.umaryland.edu (J.M. Geiger-Brown).

Abbreviations

CBT-I	cognitive behavioral therapy for insomnia
DSM	Diagnostic and statistical manual of mental disorders
ICSD	International classification of seep disorders
ISI	insomnia severity index
OT	other therapy. These include conditions applied to the control group to provide attention similar to that received by the intervention group (e.g., sleep hygiene and other types of education) that would be unlikely to influence sleep-related outcomes
PSQI	Pittsburgh sleep quality index
RCTs	randomized controlled trials
SD	standard deviation
SE	sleep efficiency
SMD	standardized mean difference
SOL	sleep onset latency
TAU	treatment as usual (control)
TST	total sleep time
WASO	wake after sleep onset
WLC	wait list control

[23] to the DSM-V [24] such that insomnia is now diagnosed using the same diagnostic code when independent or comorbid with another medical or psychiatric condition. Similarly, the International classification of sleep disorders (ICSD)—3 [25] moved to remove the differentiation between primary and secondary insomnia and placed all insomnia into one diagnostic code. The implications of this change for clinicians are that both the medical or psychiatric disorder and the patient's insomnia should be treated, and clinicians need to understand the research evidence for treatments that address insomnia comorbid to medical and psychiatric conditions.

Cognitive behavioral therapy for insomnia (CBT-I) is a behavioral treatment that has proved to be a very effective and durable treatment for insomnia in individuals with primary insomnia. Since the original meta-analysis demonstrating its effectiveness [26], multiple reviews and meta-analyses have supported the efficacy of both face-to-face and self-help CBT-I in improving and remitting insomnia [5,27—31]. More recently, CBT-I has been applied to the treatment of comorbid insomnia. The number of published studies supporting the use of CBT-I for treatment of comorbid insomnia has burgeoned since 2000. Several excellent review papers, including Smith, Huang & Manber [7], Stepanski & Rybarczyk [20], Rybarczyk et al. [21] and Lichstein et al. [32] have supported the benefit of CBT-I in comorbid insomnia.

To date there has been no meta-analytic synthesis of studies of comorbid insomnia quantifying this effect using selection criteria that carefully specify the case definition for insomnia and the treatment components and dose adequate to ensure active treatment, and allow for both single disease and mixed disease populations. Sufficient literature now exists to assess the effect of CBT-I meta-analytically in a heterogeneous sample of patients with comorbid insomnia and medical and/or psychiatric disorders. To that end, the aim of this study was to quantify the effect of CBT-I in a mixed sample of studies of patients with medical or psychiatric disorders.

Methods

Identification of eligible studies

To identify eligible studies, two research librarians (KD, EL) developed and conducted searches in MEDLINE (PubMed), Embase (Elsevier), CINAHL (Ebsco), PsycINFO (Ovid), and the Cochrane Central Register of Controlled Trials (Wiley). Search strategies were customized to each database (see the Appendix for an example of one search strategy, for PubMed) and included controlled vocabulary and text words comprising the concepts of insomnia and cognitive behavioral therapy, including individual interventions (e.g., sleep restriction, stimulus control). Filters were added to restrict studies to clinical trials published between 1985 and February, 2014. Additionally, bibliographies of published studies, review papers and meta-analyses were examined to identify additional studies, and proceedings of conferences likely to present papers on CBT-I (sleep medicine, psychology/psychiatry, geriatrics) were reviewed to locate potential abstracts for inclusion. The dataset before screening included 2257 potential references.

Study selection

There is a large literature in this area, so selected studies were confined to randomized controlled trials (RCTs), the most rigorous test of effect, using multi-component CBT-I where, at minimum, components included stimulus control and sleep restriction. These two components were required elements because they are widely considered the most efficacious interventions for insomnia [33—35]. This perspective is, in part, based on the evidence that these components of CBT-I are effective as mono-therapies. Only studies providing four or more treatment sessions were included, as a duration of four sessions has been shown to effectively treat insomnia and may be the optimal dose for durable response to treatment [36—38]. An excellent meta-analysis of computerized CBT-I has recently been published [29], so only studies involving delivery of face-to-face (individual or group) therapy were included.

Additionally, only studies conducted in adults, using standardized diagnostic criteria for insomnia, were included to reduce study heterogeneity due to variation in the sample beyond their comorbidity. Acceptable criteria for insomnia diagnosis were based on standardized definitions in the DSM-III or IV (American Psychiatric Association) [39,40], the ICSD or ICSD-2 (American Sleep Disorders Association) [41,42] or the research diagnostic criteria for insomnia (American Academy of Sleep Medicine) [43]; or an insomnia severity index (ISI) score greater than seven [44]. Only one study in the final sample used the ISI as sole criterion for insomnia, using a score of 10 as their cutoff for inclusion [45], a cutoff score that has shown optimal sensitivity and specificity for detecting insomnia cases in a community sample [46]. Study participants had to have at least one medical diagnosis, psychiatric diagnosis or combination of both, or at least half of a mixed sample of primary and comorbid insomnia patients had one or more medical or psychiatric conditions (as was seen in some community-based primary care samples). This criterion was selected to allow studies of chronically ill mixed populations seen in primary care to qualify for inclusion. Minimum statistical requirements for inclusion were that the study reported results in a form usable for meta-analysis including unadjusted means and standard deviations (SD) or standard errors, unadjusted means and 95% confidence intervals or interquartile ranges with symmetrical distribution. Inclusion and exclusion criteria are listed in Table 1. Titles and abstracts were independently assessed by two authors, and disagreements were resolved by consensus with a third author. All relevant articles were retrieved and full articles were reviewed independently by two reviewers based on inclusion and exclusion criteria. Final selection of articles was performed by consensus of four authors (JG-B, VR, WL, MD-A).

Outcome variables

Most studies reported sleep parameters from sleep diaries, including one or more of the following: sleep onset latency (SOL),