



A review of the literature on chiropractic and insomnia

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Abstract

Objective: The purpose of this literature review is to critically review the evidence for chiropractic as a treatment of primary insomnia.

Methods: A search of the following databases up to October 2006 was conducted: PubMed, PEDro, MANTIS, CINAHL, and the specialized register of the Cochrane review group. We also performed hand searching of relevant journals. Randomized clinical trials, clinical trials, and case studies of chiropractic treatment of insomnia were included. It was required that each study used at least one form of standard patient outcome measure. Treatment strategies included manual therapy such as spinal manipulative therapy or muscle relaxation techniques. The review focused on articles published in indexed, peer-reviewed journals.

Results: Fifteen studies met the selection criteria. There were no randomized clinical trials specific to chiropractic and insomnia. One study was a survey of opinion for treatment regimens for insomnia, which had low methodological scores. Another study assessed osteopathic cranial manipulation for insomnia, which appeared to have positive effects. Four studies identified physiotherapy treatment and manual therapy. A further 9 studies related to mind-body medical therapies and impaired health status, sleep disorders, and pain in the craniomandibular and cervical spinal regions.

Conclusion: Some studies have noted improvement in insomnia following manual therapy; however, based on clinical trials, there is minimal evidence of support for chiropractic in insomnia. Further studies with high methodological scores need to be conducted.

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Introduction

Sleep disorders are a common ailment in current society, one that has significant implications for public health.¹ *Insomnia*, the most common of those

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sleep disorders, is defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* as difficulty initiating sleep, difficulty maintaining sleep, or difficulty obtaining restorative sleep with associated daytime dysfunction or distress due to that lack of sleep.² It is associated with significant health problems including reduced quality of life, work productivity, and mental health.³ Insomnia has a high prevalence in society; and although numbers vary, approximately two thirds of adults will have one or more episodes of insomnia each year, and approximately 15% of adults per year will have a serious chronic episode.⁴

Insomnia is caused by a variety of physiological, psychological, and environmental factors. It manifests as a disturbed sleep that can include difficulty falling asleep and restless, unrefreshing, or broken sleep, and is associated with daytime effects such as depression, anxiety, fatigue, irritability, reduced memory, and concentration.⁵ Insomnia is a common comorbidity with chronic pain conditions such as chronic low back and chronic neck pain.

Insomnia can be diagnosed as primary or secondary. Secondary insomnia, the most common, is a symptom of an alternate disease process. Examples include psychiatric disorders, medications or drugs, circadian rhythm disorders, and other sleep-related physiologic disorders such as periodic limb movement, restless leg syndrome and central and obstructive sleep apnea, narcolepsy, and neurologic and medical illnesses.⁴ Primary insomnia is diagnosed when all other secondary causes have been ruled out or when the cause of primary insomnia has been identified. Primary insomnia is considered to be psychophysiologic, the classic form of primary insomnia in which patients negatively condition themselves into a chronic tension regarding sleep that is maintained by learned sleep-preventing techniques. It is idiopathic, a rare lifelong ability to obtain sleep that begins at birth; sleep state misperception, a subjective complaint of sleep disturbance that is not objectively measured by polysomnography; or inadequate sleep hygiene, which is learned habits of activities of daily life that is not conducive to obtaining a good sleep.⁴

The etiology of primary insomnia is relatively unknown. Interestingly, the symptoms and signs of sleep deprivation are not entirely the same as insomnia, therefore indicating that it is not only the lack of sleep in insomnia sufferers that is causing the myriad of symptoms and signs.⁶ Sleep itself is an active inhibitory process and not the passive consequence of reduced sensory input or reduced reticular formation

activity. The underlying neurologic cause for insomnia, thus far, has not been determined conclusively, although it is believed that it is inhibited below the midpons level. Theories suggested are that it may be due to reduced inhibition due to discreet lesions in the raphe nuclei or medial, suprachiasmatic portion of the anterior hypothalamus, or possibly a circulating sleep chemical, such as muramyl peptide, in the blood and cerebrospinal fluid.⁷

The most common treatment of insomnia is pharmacologic intervention with benzodiazepine and benzodiazepine agonists. Although these drugs have been consistently shown in objective and subjective studies to increase sleep time and to reduce sleep latency and onset time, they are associated with dependency and withdrawal symptoms and only treat the symptoms in the short term, not the underlying problem, and thus are not an effective cure.⁸

Because of many insomniacs, even under treatment, not getting full relief from their condition, alternate drug-free therapies should and are being investigated. Examples of common modalities used in the treatment of insomnia include cognitive behavioral therapy, sleep hygiene education, stimulus control, muscle relaxation, sleep restriction, exercise, and bright light therapy. These treatments have been shown to be effective in reducing the effects of insomnia in up to 80% of the patients; however, the effects vary considerably from patient to patient. Thus, the need to continue research and widen the scope is still necessary.⁹

Chiropractic spinal manipulative therapy has anecdotal evidence for reducing sleep disturbance in patients. However, there appears to be minimal quality evidence to support this relationship. Some studies have noted relationships between sleep disorders and other musculoskeletal conditions such as headache or migraine.¹⁰⁻¹² The objective of this study was to conduct a review of the literature on chiropractic and insomnia.

Methods

Search strategy

We searched the following databases up to October 2006: PubMed, PEDro, MANTIS, and the specialized register of the Cochrane review group for articles that contained the key words *chiropractic* and *insomnia*. After initial search, additional terms were added to include *physiotherapy*, *manual therapy*, and *neck*

pain. We also performed hand searching of potentially relevant journals.

Selection criteria

We included randomized clinical trials and case studies of chiropractic care for insomnia.

Data collection and analysis

Two independent reviewers searched for trials to be included in the review based on the search strategy and on the basis that they incorporate treatment of chiropractic spinal manipulative therapy for primary insomnia. Differences in the results of selection were resolved by discussion between the 2 reviewers.

Main outcome measures

All studies used at least 1 form of patient outcome measure (eg, sleep diaries, Pittsburg Sleep Quality Index [PSQI]).^{3,13} In addition, treatment strategies included manual therapy, such as spinal manipulative therapy or muscle relaxation techniques.

Results

As a result of an initial search identifying only 2 studies,^{14,15} we expanded the selection criteria of *chiropractic* and *insomnia* to include *physiotherapy*. This search identified 4 studies that met the selection criteria of *physiotherapy* and *insomnia*. The topics of these studies were as follows: impact of chronic pain on health care seeking, self care, and medication; rehabilitation of chronic low back pain using continuous epidural analgesia; discomfort, awareness, and recall in the intensive care—still a problem; and postoperative analgesia by femoral nerve block with ropivacaine 0.2% after major knee surgery.¹⁶⁻¹⁹

Another search was conducted with the selection criteria to include *manual therapy*. This search did not identify any studies that met the selection criteria. A further search was conducted using the selection criteria *neck pain* and *insomnia*. This search identified 9 studies that met the selection criteria. From this search, 2 studies were of interest, but again were not randomized controlled trials. The topics of these studies were use of mind-body medical therapies, impaired health status, sleep disorders, and pain in the craniomandibular and cervical spinal regions.^{20,21}

The search identified only 2 studies that met the selection criteria of *chiropractic* and *insomnia*.^{14,15} However, neither study was a randomized controlled trial specific to chiropractic and insomnia. One study identified was a survey of opinions for treatment regimens for insomnia, which are low levels of scientific evidence. Jamison¹⁴ (2004) performed prospective and retrospective studies using questionnaires and semistructured interviews to gain chiropractors' and patients' opinions on chiropractic and insomnia. Jamison's results were largely inconclusive; and although one third of patients noted an improvement in sleep, there were no trends with respect to sleep latency, duration, night arousal, sleep quality, or freshness. Certain parameters of the study could be addressed to improve the quality of the study. A larger sample size of chiropractors surveyed would give a more accurate representation of the opinion of chiropractors and the effect chiropractic has on insomnia. In addition, retrospective studies are largely based on subjective measures and may rely on patient recollection that may not be reliable. Patients selected were generally long-term patients of chiropractic, and their desire to help their practitioner or support their chiropractor's efforts could create bias. Patients may also wish to reinforce and validate their time, energy, and money spent at the chiropractor's office, which may also be a significant factor that may bias their recollection. Most patients were long-term patients under chiropractic care, which may not give an accurate representation of sleep habits before and after the onset of chiropractic care. The study was conducted in an attempt to discover the effect of an adjustment on the following weeks' sleep rather than the occurrence of sleeping difficulties or insomnia with chiropractic treatment or without chiropractic treatment. In this case, the use of validated sleep questionnaires may have given a more accurate representation of a before-and-after situation.

Cutler et al¹⁵ (2005) used an osteopathic technique to investigate cranial manipulation and its effects on sleep latency and sympathetic nerve activity. The focus of this study was the use of a particular method of cranial manipulation, compression of the fourth ventricle (CV4) technique to determine if cranial manipulation is effective in decreasing sleep latency. Cutler et al hypothesized that the use of the CV4 technique may decrease sleep latency by decreasing sympathetic tone measured by muscle sympathetic nerve activity (MSNA) and found results consistent with their hypothesis. Sympathetic nerve activity was assessed by MSNA and was reduced via a technique to

alter cranial rhythmic impulse. The authors concluded that cranial manipulation did alter sleep latency and MSNA, but were not able to establish any potential mechanisms. This study also did not discuss whether included subjects had any difficulties with staying asleep, a problem from which many insomniacs suffer.

The study of Cutler et al was limited by a small number of participants ($n = 20$) and further by all subjects not having every measurements performed on each person. In addition, the control group had no treatment at all, allowing for an attention bias effect in their results. The authors also noted that a clear relationship between CV4 technique, sleep latency, and MSNA had not been established.

Discussion

Sleep disturbance, such as insomnia, is common in patients suffering from chronic musculoskeletal pain.²² Other chronic pain syndromes, such as fibromyalgia, are almost always associated with sleep disturbances and fatigue. Lobbezoo et al²¹ (2004) investigated the relationship between health status, sleep disorder, and musculoskeletal pain in the craniomandibular and cervical spine regions. The authors concluded that sleep disorders are frequently found in patients with chronic trigeminocervical pain. Chiropractic treatment has been shown to be effective in the treatment of chronic pain and chronic pain syndromes such as fibromyalgia.^{23,24} Hains and Hains²⁴ noted in their study on fibromyalgia that pain and sleep disturbance were improved after chiropractic manipulation in 60% and 63% of patients, respectively.

Because of the limited number of articles specific to the topic of chiropractic treatment of insomnia, there are limitations in making conclusions based on this evidence. Currently, there is little evidence for chiropractic treatment of insomnia. However, there is a wealth of information available about insomnia diagnosis and treatment of which many chiropractors may not be aware.

The direct and indirect costs of sleep deprivation associated with insomnia within Australia alone are vast. The direct health costs of sleep disorders includes hospital care, health practitioners, pharmaceuticals, diagnostic tests, health aids and appliances, aged care, research, community and public health, and capital and administration. A total of \$200 million was spent on these direct costs in Australia in 2004. Inpatient

hospital costs were the highest subdivision with \$60.7 million being spent here; then \$36.5 million was spent on general practitioner costs and \$22.5 million on specialist practitioner costs.²⁵

Indirect costs of sleep disturbance include financial and nonfinancial costs that are not health costs, such as work-related injuries and road accidents, lost production and absenteeism, low productivity, and premature mortality. The total indirect costs are \$9663 million. The highest subdivisions of this money are \$2690 million for work-related injuries, \$1100 for motor vehicle accidents, and \$4080 million for the net cost of suffering.²⁵

The American Academy of Sleep Medicine task force reviewed 48 clinical trials and 2 meta-analyses to prepare practice strategies for drug-free treatment policies in managing chronic insomnia. It found that nonpharmacologic treatments provide reliable, lasting changes for 70% to 80% of chronic insomnia sufferers in several sleep parameters. These changes however varied greatly in their scope of treatment response. It determined that stimulus control and muscle relaxation were supported and that cognitive behavior therapy and sleep restriction therapy were probably effective treatment regimens.⁹

In 2003, a retrospective cohort study was done in France with 400 insomniacs and 400 good sleepers.²⁶ The study showed that insomniacs were more frequently absent from work and that their absences lasted longer (average 2 days vs 1.6 days). Sleep disturbance also causes a lack of alertness, an inability to concentrate, and fatigue, which in turn can cause not only accidents and errors within the workplace, but also a reduction in productivity and performance.²⁷ It is a source of concern for many employers because of the increased safety risks and loss of income due to reduced performance.

A more current meta-analysis confirmed that behavioral interventions for the treatment of chronic insomnia are largely effective in the sleep parameters of sleep quality and sleep efficiency and are moderately effective in sleep latency.²⁸ They were not, however, effective in total sleep time. It did not note a great amount of difference between the types of therapies, except that relaxation therapy seemed to be the least effective of the behavioral interventions. Although certain studies have shown success in treatment with bright light therapy,²⁹ a recent systemic review showed that there was not a significant amount of research that confirmed this claim.³⁰ Finally, there tends to be a general consensus that physical exercise benefits sleep quality; however, recent reviews show there is a lack of

objective evidence in support for it as a treatment modality for insomnia.³¹

It is uncertain how chiropractic care may impact insomnia. Some research suggests that chiropractic spinal manipulative therapy may affect type 1 and 2 mechanoreceptors by exciting a γ -aminobutyric acid (GABA)-ergic inhibitory neuron that interrupts the transmission of nociceptive impulses from the thalamus to the limbic system.³² At the same time, the dorsal column where the A- β fibers travel also stimulates the hypothalamus. The hypothalamus houses the ventrolateral preoptic nucleus (VLPO cluster), a dense cluster of neurons that become active when non-rapid eye movement sleep is initiated.³³ Nearly 80% of these neurons contain both the GABA-synthesizing enzyme glutamic acid decarboxylase and the peptide galanin. Because both galanin and GABA are known to inhibit the locus coeruleus, the descending projection from the VLPO is likely to be inhibitory in nature and allows relaxation of the mind, thus promoting non-rapid eye movement sleep. If the VLPO cluster in the hypothalamus is stimulated by A- β fibers, normal proprioception will have an effect on the VLPO. If normal proprioception is disturbed, theoretically so will the activity of the VLPO. However, no research has shown that there is any correlation between proprioceptive input to the VLPO and its activity. Pathways have been postulated, but no conclusive evidence exists.³²

Outcome measures that clinicians can use to assess insomnia

The PSQI is a validated and widely used questionnaire to assess the quality of sleep.^{13,34} It contains 19 self-rated questions and 5 questions rated by the bed partner or roommate. The latter 5 questions are used for clinical information only and not included in the scoring of PSQI. The 19 self-rated questions assess a variety of factors relating to sleep quality, estimate of sleep duration, and latency and the frequency and severity of sleep-related problems.

The Short Form-36 questionnaire is a well-tested and established questionnaire that fulfills stringent criteria of reliability and validity and will be used as a generic indicator of general health status.³⁵⁻³⁷

The Neck Disability Index questionnaire has been well validated.³⁸ It consists of 10 different items (eg, pain intensity, lifting, and traveling), and calculation of the score will result in a disability percentage.

Beck's³⁹ depression inventory is a 21-question inventory used for measuring severity of depression and will be administered because of the high correlation between insomnia and depression. The questionnaire is designed for adults aged 17 to 80 years and is composed of items relating to the symptoms of depression such as hopelessness and irritability, feelings of guilt or being punished, as well as physical symptoms such as fatigue, weight loss, and decreased libido. The overall score is computed from available information. Results categories include minimal depression, mild depression, moderate depression, and severe depression. Higher total scores indicate more severe depressive symptoms.

Limitations

The limitations of this study include that the search strategies were pragmatic and not done using systematic methods. Because so few studies were found, no critical review or assessment was performed on the studies.

Conclusion

Sleep disorders and the consequences of insomnia are important issues for our society. Not only do sleep disorders affect the health of sufferers, but there is a tremendous cost related directly and indirectly to workplace productivity, health care costs, accidents, and loss and suffering from these accidents. There has been anecdotal evidence of the benefits of chiropractic care and its effects on insomnia; however, no definitive evidence has been obtained. Sleep disorders are multifaceted disorders, which often require advice and lifestyle changes; and their prognosis may be further improved with other interventions, such as chiropractic. This study found that there is a deficit in the literature analyzing chiropractic spinal manipulative therapy in the treatment of sleep deprivation. Large randomized controlled trials are required in this area to assess the validity of spinal manipulative therapy as treatment of insomnia.

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