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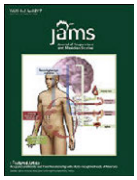

Impact of Acupuncture on Chronic Insomnia: A Report of Two Cases with Polysomnographic Evaluation

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Abstract
Objective: This report aimed to present the acupuncture treatment response of two patients who were evaluated with polysomnography.
Clinical features: Acupuncture treatment was planned for two patients who refused medical treatment with chronic insomnia. Polysomnographic evaluation was performed at baseline and 1 month after acupuncture treatment.
Conclusion: Remarkable improvement was determined in polysomnographic parameters of both cases. After acupuncture treatment, improvements in subjective symptoms such as unrefreshing sleep, morning headache, reduced motivation and daytime performance, tiredness, sleep disturbances, fatigue, and mood worsening in the morning were also observed. Clinical studies with more cases with polysomnographic evaluation are necessary to investigate the effectiveness of acupuncture in the treatment of insomnia.

1. Introduction

Insomnia is one of the most common sleep disorders seen in clinics. One of the predominant features of insomnia is difficulty in falling and staying asleep, which would have a negative impact on the body's ability to restore itself so that it can function normally during the day [1].

The resulting daytime mood changes and difficulties in concentration may lead to impaired work performance, automobile accidents, etc., which place a high economic burden on the society [2].

Increasing age, female gender, medical and psychiatric disorders, and use of medications are risk factors for insomnia [3]. The reported incidence of insomnia is 11.7—37% in European countries, and it is 9.2—11.9% in Asian countries [4].

The revised classification by the American Academy of Sleep Medicine has defined three forms of insomnia: chronic, short term, and others.

If the duration and frequency of symptoms are shorter, the disorder is diagnosed as short-term insomnia [5]. The

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preferred treatments for chronic insomnia include hypnotic medications and cognitive-behavioral therapy (CBT). For the treatment of insomnia in the short term, benzodiazepine receptor agonists have been reported to be effective, but the evidence for their long-term effectiveness is limited and their use is associated with severe side effects, such as daytime tiredness, impaired cognition, and possible addiction. The effectiveness of CBTs has been shown in randomized clinical trials, but their use requires trained therapists who are not available in required numbers; thus, CBTs are not so widely used [6].

An alternative therapeutic method for treating insomnia is acupuncture, which is based on the theory of meridians of traditional Chinese medicine TCM and is extensively used in China for that purpose. The literature contains studies attesting to the effectiveness of acupuncture in the treatment of insomnia [7].

In this report, we present the cases of two patients with chronic insomnia who were treated with acupuncture; their treatment response was evaluated, in addition to symptomatology, using polysomnography, a standard tool in sleep medicine for evaluating sleep-related pathophysiology, sleep architecture, and sleep integrity.

2. Case Presentation

2.1. Case 1

A 45-year-old female police officer with complaints of difficulty in initiating sleep, fragmented sleep, and day-time anxiety about being unable to fall asleep at night was referred to our department. Her symptoms had been ongoing for 5 years and getting worse during the previous 6 months. She had trouble in falling asleep, spending 1 or more hours in the bed before being able to sleep; would be awake five to six times during the night, resulting in morning headaches; and was always tired in the mornings more than five times a week. Clinical and polysomnographic evaluation led to a diagnosis of chronic insomnia. As she refused any kind of medication, we suggested acupuncture treatment. After acupuncture treatment, a better sleep structure and decreased subjective symptoms have been observed.

2.2. Case 2

A 49-year-old housewife with difficulty in falling and staying asleep, resulting in fatigue and tiredness in the morning for 6 years, was referred to our department. The patient's medical history included a right mastectomy because of breast cancer 6 years earlier. The patient was diagnosed with chronic insomnia by clinical and polysomnographic evaluations. As she was unwilling to use medications, we suggested acupuncture treatment. After acupuncture treatment, a significant sleep structure was observed, and her subjective complaints were fewer.

3. Materials and methods

In this study, the diagnosis of insomnia was based on the International Classification of Sleep Disorders insomnia criteria [5]. Acupuncture treatment was planned for two patients who had refused medical treatment for chronic insomnia. The treatment used acupoints selected on the basis of our clinical experience, a literature review, and the principles of TCM. Acupuncture using disposable sterilized acupuncture needles (0.25 mm $\times$ 25 mm; Shangai Kangnian Medical Device Co., Shangai, China) was given every other day for 3 weeks. The needles were inserted to a depth of 10—20 mm at the following acupoints: Sishengcong (EX3 HN1), Baihui (DU-20), Shenting (DU-24), Hegu (LI-4), Shenmen (H-7), and Sanyinjiao (SP-6) bilaterally. When the patient felt dull pain or acupuncture sensation (de qi), the manipulation was stopped and the needle was left in place for 20 minutes. The patients were examined before and 1 month after acupuncture treatment. For the baseline and control sleep tests, demographic data and medical histories of the patients were recorded. We performed video-assisted overnight polysomnography (Neuron Spectrum; Sleep Systems, Ivanovo, Russia) using electroencephalogram, electro-oculography, and electromyography. With the sleep stages scored using American Academy of Sleep Medicine rules, we were able to determine the total sleep time, which is the time from falling asleep to awakening in the morning minus the periods of time awake during the night; sleep efficiency index, which is the ratio of total sleep time to time in bed; sleep latency; and relative durations of the various stages of sleep. All values were expressed as a percentage of the sleep period time (time from falling asleep to the last epoch of sleep). Electrocardiograms were taken from the time the patient went to bed until the time the patient got out of bed. In this study, parameters such as percent of sleep efficiency, sleep latency in minutes, wake after sleep onset in minutes, percent of time spent in the rapid eye movement stage, and percent of time spent in Stages 1, 2, and 3 of sleep were assessed. We also recorded the apnea—hypopnea index [8].

4. Discussion

The sleep—wake cycle is a very complicated process related to the central and peripheral nervous systems, and the endocrine system. According to modern medicine, distribution of the anatomical structure of the sleep—wake cycle, including inhibitory and arousal nucleus and the imbalance of corresponding neurotransmitters, causes insomnia. For chronic insomnia, the first-line treatments have been benzodiazepine receptor modulators, benzodiazepines, antidepressants, and CBTs. Pharmacological treatment has been shown to be effective in the short term, but is associated with significant side effects, such as tiredness during the day, impaired cognition, and medication dependency. Despite their clinical effectiveness, CBTs are not widely used as they are labor intensive and require trained therapists, who are not available in required numbers.

Traditionally, acupuncture has been used in China to treat insomnia, and recently, it has become accepted in Western countries. In TCM, disharmony between the Zang and Fu organs, impairment of the Wei and Ying Qi distributions to Yang organs, and imbalance of Ying and Yang may cause insomnia. Many researches have been conducted on

Table 1 Sleep parameters for the two cases.

	Case 1		Case 2	
	PSG (baseline)	PSG (4 wk later)	PSG (baseline)	PSG (4 wk later)
Total sleep time (min)	293	321.5	285	362.9
Sleep efficiency index (%)	89.7	95.4	85.9	91
Sleep latency (min)	36	17.5	64	33.5
Total sleep period time (min)	361.5	362.9	337.3	395
Wake after sleep onset (min)	45.5	69.5	14.5	51.5
REM stage %	12.3	17.2	10.6	19.6
Stage 1 sleep %	12.6	13	8.8	8.4
Stage 2 sleep %	70.8	56.8	66.3	51.1
Stage 3 sleep %	4.4	13	14.3	20.8
AHI	1.12	0.82	4.67	3.52

AHI = apnea—hypopnea index; PSG = polysomnography; REM = rapid eye movement.

the use of acupuncture in clinics to treat insomnia. Some studies have demonstrated that acupuncture appears to have better outcomes than conventional pharmacological drugs [9], and basic neuroendocrinological studies in the literature support the efficacy of acupuncture treatment. In a proposed potential mechanism for acupuncture treatment, various neurotransmitters, such as norepinephrine, melatonin, gamma-aminobutyric acid, and β-endorphin, are mediated [10]. As an example, acupuncture increases the contents of gamma-aminobutyric acid and serotonin in the brain, thus improving sleep quality. Moreover, the endocrine system is affected, resulting in a nocturnal increase in the secretion of endogenous melatonin [11,12]. Acupuncture is thought to return the sleep—wake cycle to normal as well. Gao et al [13] reported that an imbalance in sleep deprivation occurs; thus, acupuncture can be thought as a homeostatic force that renormalizes Yin and Yang. The biphasic regulation effect of acupuncture is a unique salience network composed of the anterior insular cortex and anterior cingulate, which might account for the effectiveness of acupuncture in preventing sleep deprivation [14].

The treatment in this study used a protocol of points selected on the basis of our clinical experience, a review of pertinent literature, and the principles of TCM. In the treatment of insomnia, depression, and anxiety, the DU-24, EX-HN1, DU-20, LI-4, and HT-7 acupoints are most commonly used. In addition, the Sp-6 acupoint plays an important role in inducing sedation and tranquility [15]. Furthermore, polysomnographic studies may be an important, objective tool for diagnosis, follow-up, and differential diagnosis of insomnia as sleep integrity can directly be measured. For the characterization of the quality of sleep during the night, latency to sleep onset, total sleep time, number of arousals and awakenings, and sleep efficiency are routinely measured [16,17]. Both our patients showed remarkable progress in terms of sleep efficiency index, sleep latency, sleep period time, and wake after sleep onset. The rates of rapid eye movement and nonrapid eye movement stages were also improved after acupuncture treatment (Table 1). Our results for the treatment of two patients with chronic insomnia indicate that subjective symptoms, such as unrefreshing sleep, headaches, and mood worsening in the morning, reduced motivation and daytime performance, tiredness, and sleep disturbances, are improved after acupuncture treatment. Over a period of 1 month, we observed improved well-being during the day and during sleep, and improved objective findings. Thus, we can conclude that acupuncture may be an effective and safe complementary treatment method for patients with chronic insomnia who are not candidates for, or have refused, conventional medical treatment.

Disclosure statement

The authors declare that they have no conflicts of interest related to the material of this manuscript.

References

[1] The American Psychiatric Association. *Quick Reference to the Diagnostic Criteria from DSM-IV-TR*. 1st ed. Virginia, United States: The American Psychiatric Publishing; 2000.
[2] Ozminkowski RJ, Wang S, Walsh JK. The direct and indirect costs of untreated insomnia in adults in the United States. *Sleep*. 2007;30:263—273.
[3] Ohayon MM, Caulet M, Lemoine P. Comorbidity of mental and insomnia disorders in the general population. *Compr Psychiatry*. 1998;39:185—197.
[4] Kessler RC, Berglund PA, Coulouvrat C, Hajak G, Roth T, Shahly V, et al. Insomnia and the performance of US workers: results from the America Insomnia Survey. *Sleep*. 2011;34:1161—1171.
[5] American Academy of Sleep Medicine. *International Classification of Sleep Disorders*. 3rd ed. Darien, IL: American Academy of Sleep Medicine; 2014.
[6] Pinto Jr LR, Alves RC, Caixeta E, Fontenelle JA, Bacellar A, Poyares D, et al. New guidelines for diagnosis and treatment of insomnia. *Arq Neuropsiquiatr*. 2010;68:666—675.
[7] Ernst E, Lee MS, Choi TY. Acupuncture for insomnia? An overview of systematic reviews. *Eur J Gen Pract*. 2011;17:116—123.
[8] American Academy of Sleep Medicine. *The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Technical Specifications*. Westchester, IL: AASM Manual for Scoring Sleep; 2007.

[9] Johannah LS, Xiaojia N, Melinda LJ, Anthony LZ, Xinfeng G, Yan L, et al. A systematic review of acupuncture for sleep quality in people with insomnia. *Complement Ther Med*. 2016; 26:11—20.
[10] Zhao K. Acupuncture for the treatment of insomnia. *Int Rev Neurobiol*. 2013;111:217—234.
[11] Spence DW, Kayumov L, Chen A, Lowe A, Jain U, Katzman MA, et al. Acupuncture increases nocturnal melatonin secretion and reduces insomnia and anxiety: a preliminary report. *J Neuropsychiatry Clin Neurosci*. 2004;16:19—28.
[12] Jiao Y, Han Y, Li X, Fang YG, Liu ZH, Zhou WN, et al. Comparison of body, auricular, and abdominal acupuncture treatments for insomnia differentiated as internal harassment of phlegm-heat syndrome: an orthogonal design. *Evid Based Complement Alternat Med*. 2015;2015:578972.
[13] Gao L, Zhang M, Gong H, Bai L, Dai XJ, Min Y, et al. Differential activation patterns of FMRI in sleep-deprived brain: restoring effects of acupuncture. *Evid Based Complement Alternat Med*. 2014;2014:465760.
[14] Dhond RP, Kettner N, Napadow V. Neuroimaging acupuncture effects in the human brain. *J Alternat Complement Med*. 2007;13:603—616.
[15] Guo J, Wang LP, Liu CZ, Zhang J, Wang GL, Yi JH, et al. Efficacy of acupuncture for primary insomnia: a randomized controlled clinical trial. *Evid Based Complement Alternat Med*. 2013;2013:163850.
[16] American Academy of Sleep Medicine Practice Parameters. Practice parameters for using polysomnography to evaluate insomnia: an update. *Sleep*. 2003;26:754—760.
[17] Sharafkhaneh A, Hirshkowitz M. Contextual factors and perceived self-reported sleepiness: a preliminary report. *Sleep Med*. 2003;4:327—331.