



## A systematic review of acupuncture for sleep quality in people with insomnia



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### ARTICLE INFO

#### Article history:

Received 12 November 2015  
Received in revised form 22 January 2016  
Accepted 15 February 2016  
Available online 18 February 2016

#### Keywords:

Insomnia  
Acupuncture  
Systematic review  
Meta-analysis  
Randomized controlled trial

### ABSTRACT

**Objective:** Acupuncture is widely used in Asia and increasingly in Western countries. We performed a systematic review and meta-analysis to examine the effects of acupuncture for insomnia.

**Methods:** We identified randomized controlled trials from English and Chinese databases. Data were extracted using a predefined form and analysed using RevMan 5.2. We included studies that compared acupuncture to sham/placebo, standard pharmacotherapy or cognitive behavioral therapy. Risk of bias was assessed using the Cochrane risk of bias tool. The primary outcome was sleep quality assessed by the Pittsburgh Sleep Quality Index (PSQI).

**Results:** A total of 30 studies involving 2363 participants were included. Acupuncture point combinations included the use of at least one of the recommended points for insomnia, HT7, GV20, SP6. Pharmacotherapy control was used in 27 studies and sham/placebo in three studies. Cognitive behavioral therapy was not used in any of the studies. Pharmacotherapies in all studies were benzodiazepine receptor agonists, except for one that used an antidepressant. Acupuncture was superior to sham/placebo in terms of PSQI (MD  $-0.79$ , 95% CI  $-1.38$ ,  $-0.19$ ,  $I^2 = 49\%$ ). Acupuncture was also more effective than pharmacotherapy (MD  $-2.76$ , 95% CI  $-3.67$ ,  $-1.85$ ,  $I^2 = 94\%$ ). Most studies were at risk of bias. Some mild adverse events were reported but they were not causally related to the acupuncture treatments.

**Conclusions:** Acupuncture compared to sham/placebo and pharmacotherapy showed statistically significant results. However, the evidence is limited by bias in the included studies and heterogeneity. Well-designed studies are needed to confirm the results identified in this review.

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**Abbreviations:** AIS, Athens Insomnia Scale; ANZCTR, Australian New Zealand Clinical Trial Registry; CBT, cognitive behavioral therapy; CCMD, Chinese classification of mental disorders; ChiCTR, Chinese Clinical Trial Registry; CI, confidence interval; CNS, central nervous system; DSM, diagnostic and statistical manual of mental disorders; EU-CTR, EU Clinical Trials Register; GABA, gamma-aminobutyric acid; ICD, International Classification of Diseases; ICSD, International Classification of Sleep Disorders; ICTRP, International Clinical Trials Registry Platform; ISI, Insomnia Severity Index; MD, mean difference; PSQI, Pittsburgh Sleep Quality Index; RevMan, review manager; RR, risk ratio; WHO, World Health Organization.

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**1. Introduction**

Insomnia, characterized by trouble falling asleep, staying asleep or early wakening, affects between 5–10% of the population.<sup>1–3</sup> Insomnia dramatically impacts quality of life and day time activities,<sup>4</sup> and chronic insomnia increases the risk of psychopathology and negative health outcomes.<sup>5–7</sup> There are a number of behavioral, psychological and pharmacological options for the treatment of insomnia, however the efficacy of each can vary considerably. Attention has focused on treating insomnia with benzodiazepine receptor agonists, however they are mostly effective in the short-term management and the risk of rebound insomnia and other side-effects are high.<sup>8,9</sup> Many individuals prefer non-pharmacological treatments,<sup>10</sup> such as cognitive behavioral therapy (CBT), however such treatments can be costly and difficult to access for some patients. Given the high prevalence of insomnia in the community, there is a continuing need to broaden and improve treatment options.<sup>11,12</sup>

Complementary and alternative medicines, such as acupuncture, are used by as many as one out of four people with insomnia.<sup>13</sup> Acupuncture is a promising treatment because it is safe and widely available.<sup>14,15</sup> Insomnia can be treated with many different acupuncture points, however a combination of points around the head, on the arms and legs is recommended.<sup>16</sup> The Evidence-Based Guideline of Chinese Medicine for Insomnia recommends three main points, HT7 (*Shenmen*), GV20 (*Baihui*) and SP6 (*Sanyinjiao*).<sup>16</sup> The exact actions of these points is not fully understood, however, when used together and with other points they have a demonstrated effect on biological responses.<sup>17,18</sup>

There are a number of possible mechanisms of acupuncture for improving sleep. Acupuncture is reported to interact with the gamma-amino butyric acid (GABA) pathways and suppress central nervous system (CNS) activity.<sup>18</sup> GABA has an inhibitory effect on the brain, and is the main neurotransmitter along with several neuropeptides involved in sleep.<sup>19</sup> An increase in GABA will suppress the CNS and benzodiazepine and non-benzodiazepine hypnotics are known to act on this pathway.<sup>20</sup> In mice stimulated at acupuncture point HT7, with or without competitive GABAa receptor blockers, acupuncture was shown to work through GABA pathways.<sup>18</sup> Acupuncture on the head also increased the amount of GABA in multiple brain areas of mice.<sup>17</sup> In a clinical study of 48 people, acupuncture on HT7 and SP6 increased the amount of GABA in cerebrospinal fluid compared with alprazolam.<sup>21</sup> Acupuncture has also been shown to increase melatonin levels.<sup>22</sup> In a non-controlled

study, 18 participants with insomnia and anxiety were given five weeks of acupuncture treatment. After treatment, nocturnal urinary melatonin secretion increased. Polysomnography showed that sleep onset latency was reduced and total sleep time and sleep efficiency increased.<sup>22</sup> Acupuncture can also control autonomic nervous system function including reducing blood pressure, heart rate variability and sympathetic nerve activity,<sup>23</sup> which is often dysregulated in patients with insomnia.<sup>24,25</sup>

The efficacy of acupuncture for people with insomnia has been evaluated in previous systematic reviews and authors concluded that despite some methodological limitations acupuncture improved sleep quality and self-reported sleep duration.<sup>26,27</sup> The current review assesses the efficacy of acupuncture using recommended acupuncture points from clinical acupuncture guidelines. Inclusion of studies with recommended acupuncture points means that findings have clinical relevance and translatability into clinical practice. This review also expands on previous reviews by examining a larger number of studies and an up-to-date search of English and Chinese databases.

**2. Methods**

*2.1. Studies*

Included studies are published randomized controlled trials with parallel design.

*2.2. Participants*

Participants include those with a primary complaint of insomnia. Participants diagnosed by standard diagnostic criteria including the Diagnostic and Statistical Manual of Mental Disorders (DSM);<sup>4,28</sup> International Classification of Sleep Disorders (ICSD);<sup>29</sup> International Classification of Diseases (ICD);<sup>30</sup> or the Chinese Classification of Mental Disorders (CCMD).<sup>31</sup> Studies that included participants with comorbid disorders or those with insomnia as a secondary complaint were excluded.

*2.3. Interventions*

Interventions included needle acupuncture at one or more of the recommend insomnia points, these points are HT7 (*Shenmen*), GV20 (*Baihui*) and SP6 (*Sanyinjiao*). Studies that evaluated needle acupuncture with other acupuncture interventions such as

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