Dysfunctional cognition regarding sleep as a mediator of outcome following acupuncture for insomnia

BACKGROUND

Insomnia is a highly prevalent condition that is associated with medical and psychiatric morbidity. Cognitive, behavioural and hyperarousal models are the widely accepted theoretical models of insomnia. Studies have shown that a reduction in maladaptive beliefs and attitudes about sleep mediates the effectiveness of psycho-behavioural treatments, such as cognitive-behavioural therapy for insomnia (CBT-I).[1] Acupuncture is considered effective for the treatment of insomnia, but the mechanism of action is unclear and probably consists of both specific and non-specific therapeutic components. The specific component of acupuncture involves modulation of autonomic tone and central activation by its direct effects on peripheral nerves and muscles. Non-specific therapeutic components are considered an integral, indivisible part of complex interventions, such as acupuncture. The ambiance of the practice setting, the time and quality of attention provided by the practitioner and the expectations of the patient may be associated with sleep improvements through reductions in anxiety and by classic conditioning, social support and expectancy.[2] To our knowledge, no previous studies have examined the effects of acupuncture on insomnia using the cognitive-behavioural model. This secondary analysis of a published randomised controlled trial (RCT) aimed to examine whether a reduction in sleep-related dysfunctional cognition mediated improvement after acupuncture.

METHODS

Data were derived from our recently published RCT (ClinicalTrial.gov identifier NCT01891097). Participants fulfilled criteria A to E of the Diagnostic and Statistical Manual (fifth edition) diagnosis of insomnia disorder. Informed consent was obtained before all study procedures. A total of 224 participants were randomised in a 3:3:1 ratio to acupuncture (n=96), combined acupuncture and auricular acupuncture (n=96) and waitlist (n=32). Acupuncture or combined acupuncture and auricular acupuncture were given three times a week for three consecutive weeks. Details of the treatment protocol are available at ClinicalTrial.gov. The Insomnia Severity Index (ISI), a standard research assessment of insomnia, was used as the outcome measure in this secondary analysis. The Chinese version—16-item Dysfunctional Beliefs and Attitudes about Sleep (DBAS) scale—was used to assess dysfunctional sleep-related cognition.[3] The 16-item DBAS, with a total score ranging from 0 to 160, has four subscales covering 'consequences' (five items), 'worry/helplessness' (six items), 'sleep expectations' (two items) and 'medication' (three items). To examine the temporal precedence of mediation, we analysed the effects of changes in DBAS scores from baseline to post-treatment on the ISI at a 4-week follow-up using simple mediation analysis (figure 1). Path coefficients were estimated using a series of regression analyses.

RESULTS

Of the 224 randomised participants, 207 (92.4%) had DBAS data and were included in the secondary analysis. Their mean age was 53.9 years; 74.9% were female and 71.5% were married or cohabiting. The mean ISI score was 19.3 at baseline, indicating moderate insomnia severity. The mean DBAS total score was 105.6, suggesting a moderate degree of dysfunctional cognition. There were significant total and direct effects (c/c') (table 1), meaning that acupuncture had a significant effect on the ISI at the 4-week follow-up compared with the waitlist. Acupuncture and waitlist did not differ significantly differ in their effects on the DBAS (a); however, changes in the DBAS 'consequences', 'worry/helplessness' and 'medication' subscale scores from baseline to post-treatment were associated with an ISI

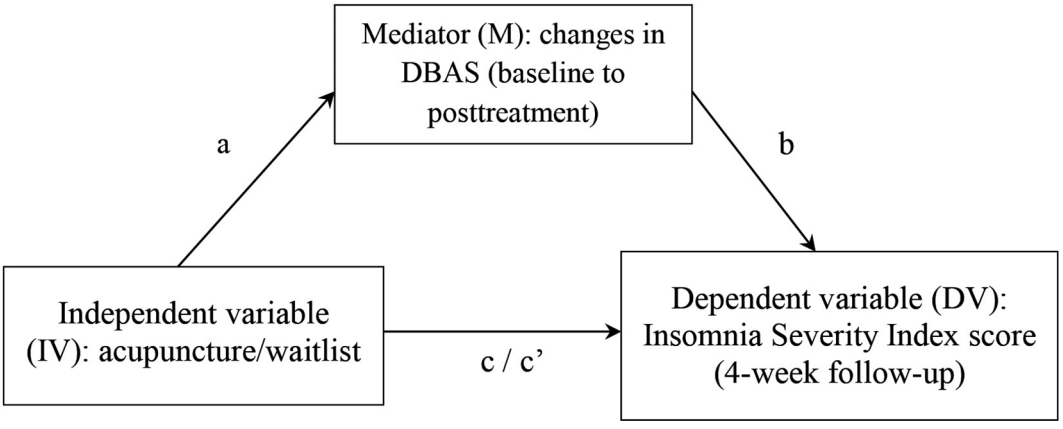

Figure 1 Graphical illustration of the mediation model. DBAS, Dysfunctional Beliefs and Attitudes about Sleep.

Table 1 Simple mediation analyses of the relationships between acupuncture/waitlist, changes in dysfunctional cognition from baseline to post-treatment and Insomnia Severity Index score at the 4-week follow-up

Mediator (M)	Effect of IV on M (a)	Effect of M on DV (b)	Total effect (c)	Direct effect (c')	Indirect effect (ab) †
Consequences	−2.56	0.14**	−4.07***	−3.72***	−0.35 [−1.01 to 0.04]
Worry/helplessness	−3.17	0.14***	−4.09***	−3.64***	−0.45* [−1.31 to −0.02]
Sleep expectations	0.21	0.06	−4.07***	−4.08***	0.01 [−0.14 to 0.35]
Medication	−0.69	0.15*	−4.15***	−4.04***	−0.11 [−0.69 to 0.17]

Baseline Insomnia Severity Index score, gender, age and education level are included as covariates.
Acupuncture (1=treatment, 0=control) and gender (1=male, 0=female) are dummy coded.
*p<0.05; **p<0.01; ***p<0.001.
†Bias-corrected 95% confidence intervals with 1000 bootstrap resamples are generated to test the significance of the conditional indirect effects and indices of moderation.
DV, dependent variable; IV, independent variable.

score at the 4-week follow-up irrespective of allocation to acupuncture or waitlist (b). The DBAS 'worry/helplessness' subscale significantly mediated the effect of acupuncture and waitlist on the ISI at the 4-week follow-up (ab).

DISCUSSION

In line with previous studies of CBT-I, changes in sleep-related dysfunctional cognition had a significant impact on insomnia in participants of an acupuncture trial; however, acupuncture and being on the waitlist did not significantly differ in their effects on dysfunctional cognition. Among the various types of dysfunctional cognition, excessive worrying and feeling helpless about sleep was most relevant to outcome. An expectancy effect might have given rise to reduced dysfunctional cognition and resulted in better sleep whether participants were allocated to acupuncture or a waitlist.[4 5]

One of the study limitations is the small number of waiting-list participants; hence affecting the statistical power to detect significant differences between acupuncture and waitlist groups with respect to dysfunctional cognition. In conclusion, the cognitive model of insomnia is applicable to recipients of acupuncture. Combined acupuncture and CBT-I may be an ideal strategy for dealing with the cognitive, behavioural and physiological factors of insomnia.

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