

# Acupuncture, Moxibustion, and Combination Therapies for Insomnia

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## Abstract

Insomnia, a common sleep disorder, affects general well-being, hastens the onset of other diseases, and impairs work performance. Hypnotic medications are efficacious in the short term but have obvious side effects. Acupuncture, often used to treat insomnia in traditional Chinese medicine (TCM), is considered to be beneficial in restoring the normal sleep-wake cycle by regulating and restoring the natural flow of *qi* (energy power). The three main TCM theories for treating insomnia by acupuncture are the tranquilization disturbance, *zangfu* disturbance (disequilibrium of internal organs), and imbalance of *yin* and *yang* theories. Moxibustion, another treatment for insomnia, is usually combined with acupuncture. Acupuncture and moxibustion with *tuina* (exercise massage), acupuncture with Chinese herbal injection, electroacupuncture, and acupuncture with medication or psychotherapy are other interventions. Some acupuncture-based methods such as needle-rolling acupuncture, auricular acupoint plaster therapy, phlebotomy, and acupoint catgut-embedding therapy are used as well. Although most clinical trials have shown that acupuncture and its combination therapies are significantly effective in insomnia, the beneficial effects may have been overvalued, because of small sample size, nonstrict inclusion and exclusion criteria, flawed methodology, short follow-up, or nonstandardized evaluation. Therefore, clinical studies of high methodological quality are needed to verify the efficacy of acupuncture, moxibustion, and other combination therapies in insomnia.

## Keywords

Traditional Chinese Medicine, Acupuncture, Moxibustion, Auricular Acupoint, Combination Therapy

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## 1. Introduction

Insomnia is a common sleep disorder; its predominant features are difficulty in initiating or maintaining sleep or nonrestorative sleep [1]. Its prevalence ranges from 11.7% to 37% in European countries [2], Asia [3], and the USA [4], depending on the definition used.

Western medicine holds that insomnia is the result of imbalance between cerebral excitation and inhibition, accompanied with such symptoms as irritability and peevishness, palpitation, decreased memory, emaciation, lassitude with dull complexion, fatigue, sleepiness, decreased alertness and concentration, and mood disturbances [5] [6]. In traditional Chinese medicine (TCM), the clinical manifestations of insomnia are attributed to deficiency of both the heart and the spleen, and the symptoms are dreamy sleep, palpitation, forgetfulness, lassitude, decreased food intake, postprandial abdominal distension, dull complexion, loose stools, pale tongue proper with thin-white coating, and thread-weak pulse [7]. Regardless of the description, patients are bothered by the sleep problem, which seriously affects health, hastens onset of other diseases, and impairs work performance [8]. Therefore, the therapeutic aim is to improve the quality of sleep.

For chronic insomnia, hypnotic medications (e.g., benzodiazepine receptor agonists) and cognitive-behavioral therapy (CBT) are the first-line treatments in western medicine [9]. Hypnotic medications are efficacious in the short term but have limited long-term benefits and are associated with side effects such as residual daytime sedation, cognitive impairment, and dependence [10]. CBT has been demonstrated to be effective by randomized clinical trials (RCTs) but is not widely used because of the lack of trained therapists [11]. TCM offers other therapeutic options for insomnia. TCM today is mainly used for maintaining health, enhancing physique, and managing chronic diseases such as insomnia, hemiplegia, diabetes mellitus, and hypertension.

Acupuncture and moxibustion are used to treat insomnia based on the theory of meridians [12]. Meridians are a network of passages of energy power, *qi*. According to *Huangdi Nei Jing* (Inner Classic), insomnia is a consequence of the vicious cycle of “daytime low-spirit” and “night-time hyperarousal state” [7] [13]. Acupuncture is considered to be beneficial in restoring the normal sleep-wake cycle by regulating and restoring the natural flow of *qi* [14]. Several Chinese clinical trials of acupuncture and moxibustion for insomnia have shown improvements in sleep quality, daytime functioning, and quality of life [15] [16]. However, international efficacy reports are limited, and the reasons are many. TCM is quite different from western medicine and difficult to understand outside traditional Chinese history and culture. Further, much of the research in TCM is recorded in ancient Chinese. The evidence is plagued by methodological limitations, high levels of heterogeneity, and publication bias [17]-[19]. Finally, TCM research is beyond the scope of most international journals. The purpose of this review is to critically examine the efficacy of acupuncture, moxibustion, and other combination therapies as alternative treatments for insomnia.

## 2. Acupuncture

Acupuncture is just one element of TCM used to treat fatigue, nausea, insomnia, diarrhea, menstrual problems, and HIV-related peripheral neuropathy [20]. It is often used in combination with exercise massage (*tuina*), moxibustion, electric pulsation, auricular plaster therapy, estazolam medication, and herbal therapy. The benefit of acupuncture and Chinese herbal therapy is the ability to decrease side effects associated with western treatments. In a double-dummy, single-blind, randomized, placebo-controlled clinical trial, acupuncture improved sleep quality and daytime functioning compared with sham group and estazolam medication (effective rate: 85% vs. 24% and 21%) [21]. Acupuncture relieves insomnia by inducing downregulation of hypothalamic  $\gamma$ -aminobutyric acid (GABA) and  $\gamma$ -aminobutyric A receptor (*GABA(A)R*) in rats and lengthens pole-climbing time [22]. It can also regulate sleep and many mental and nervous symptoms, partially through increasing NOS activity and NO content, promoting normal function of brain tissues [23].

Main and supplemental acupoints differ according to the TCM theories and patient’s “constitution deficiency”. For example, the main acupoint Shenmen (HT 7) is the *yuan* (source) point of the heart channel of Hand-Shaoyin, which dominates diseases of the heart. Needling at Shenmen (HT 7) can soothe the heart, calm the mind, relieve stuffiness of the chest, and regulate the flow of *qi*. The supplemental acupoints Quchi (LI 11), Fenglong (ST 40), and Jiexi (ST 41) are applied when phlegm-heat attacks the heart [7].

During acupuncture for insomnia, the patient lies in the supine position and relaxes the body naturally. After the skin is routinely sterilized, stainless silver, filiform needles (0.25 - 0.3 mm in diameter and 25 - 40 mm in length) (Figure 1) are inserted into main and select supplemental acupoints. The needles are obliquely moved in



**Figure 1.** Filiform, stainless silver acupuncture needles (0.25 - 0.3 mm in diameter, 25 - 40 mm in length).

the forward, backward, leftward, and rightward directions to a depth of 0.5 to 1 *cun* (1.7 - 3.3 cm) depending on the points. The twirling reinforcing-reducing method is applied after achieving *qi*, which is essential for the therapy. The needles are retained for 30 - 60 min and manipulated twice during the session. The treatment is performed once daily for 2 - 3 courses, with 10 - 12 sessions constituting one therapeutic course and a 2-day interval between courses [15] [24]. Side effects include numbness, soreness, and turgidity, but they normalize immediately after removal of the needles. The optimal time for treatment is in the afternoon. The three relevant TCM theories are tranquilization disturbance, *zangfu* disturbance, and imbalance of *yin* and *yang* [7] [25] [26].

### 2.1. Tranquilization Disturbance Theory

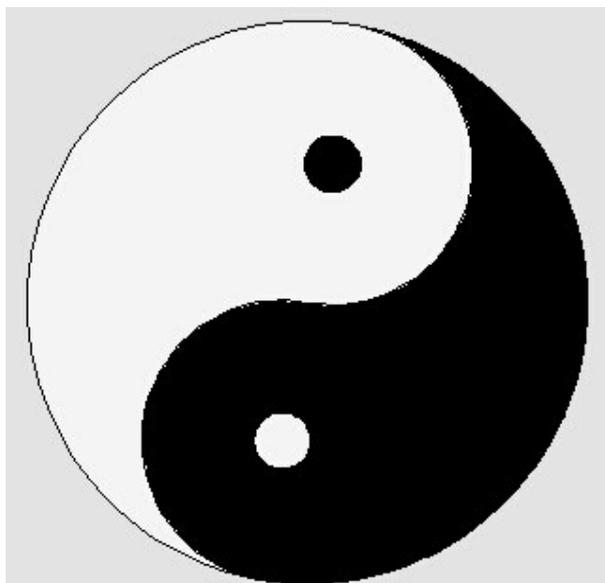
The book *Jin Yue Quan Shu*, published by Zhang Jin Yue 400 years ago during the Ming dynasty, holds that insomnia results from tranquilization disturbance, so acupuncture should mainly be performed at the points for tranquilization, specifically main acupoints. Li *et al.* selected Baihui (DU20) and Shengting (DU24) as the main acupoints to treat 110 patients with insomnia: 67 were cured, 22 showed great improvement, 12 showed some improvement, and 9 had no change, yielding an efficacy rate of 91.81% [27]. Cao *et al.* selected Baihui (DU 20), Sishenchong (EX-HN1), Taiyang (EX-HN5), Yintang (EX-HN3), Fengchi (GB20), Waiguan (SJ5), Quchi (LI11), Zushanli (ST36), Sanyinjiao (SP6), Taichong (LR3), and Qihai (RN6) as the acupoints for tranquilization and found that of 60 patients, 16 were cured, 26 showed remarkable results, 15 showed some effect and 3 were unaffected (efficacy rate of 95%) [28].

### 2.2. Zangfu Disturbance Theory (Disequilibrium of Internal Organs)

In the chapter “Xieke” of one of the earliest TCM books, *Huangdi Nei Jing-Linshu* (5000 years old), it is stated that insomnia results from *zangfu* disturbance, so acupuncture should be mainly performed at the acupoints for *zangfu*. Chang *et al.* selected Neiguan (PC6), Shenmen (HT7), Daling (PC7), Tongli (HT5), Sanyinjiao (SP6), Baihui (DU20), and Sishenchong (EX-HN1) as the main acupoints, and applied supplemental acupoints if necessary. In their study of 40 patients, 19 were cured, 19 had a remarkable effect, 6 showed some effect, and 2 had no effect (efficacy rate of 95%) [29].

### 2.3. Imbalance of Yin and Yang Theory

Three chapters in the book *Huangdi Nei Jing-inshu*, “Kouwen”, “Dahelun”, and “Genjie”, hold that *qi* goes mainly through the *yang* channel as *yangqi* for normal activity at daytime and the *yin* channel as *yinqi* for rest at night. When *qi* is still or occupies most of *yang* at night, the *yin* and *yang* balance is disturbed and insomnia occurs. *Yang* and *yin* are mostly separate, like positive and negative, but are not completely opposite; they are mutually blended, connected, and promoted (Figure 2).



**Figure 2.** The *yin* and *yang* relationship of the human body. The white and black parts represent *yang* and *yin*, respectively. *Yin* in *yang* indicates some rest during the day and *yang* in *yin* means basic, vital night-time activity.

Prolonged imbalance of *yin* and *yang* would lead to disequilibrium of the whole body. The acupoints for the three types of *yin* and *yang* imbalance are as follows: 1) excess *yang*, Baihui (DU20), Yintang (EX-HN3), Shuigou (DU26), Zusanli (ST36), Neiguan (PC6), Sanyinjiao (SP6), Hegu (LI4), Jiuwei (CV15), Zhongting (RN16), Taichong (LR3), Neiting (ST44), and Daizhui (DU14); 2) lack of *yin*, Baihui (DU20), Yintang (EX-HN3), Zusanli (ST36), Shenmen (HT7), Sanyinjiao (SP6), Taixi (KI3), Zhongting (RN16), Zhongwan (RN12), Jiuwei (RN15), Xiawan (RN10), Qihai (RV6), Guanyuan (RV4), and Daizhui (DU14); and 3) both *yin* and *yang* deficiency, Baihui (DU20), Yintang (EX-HN3), Zusanli (ST36), Shenmen (HT7), Sanyinjiao (SP6), Hegu (LI4), Guanyuan (RN4), Dazhui (DU14), Shendao (DU11), Zhiyang (DU9), Yaoyangguan (DU3), Mingmen (DU4), and Qihai (RV6). In a study of 42 patients, Lu found that acupuncture based on this theory cured 13 patients, was remarkably effective in 10 patients, effective in 14 patients, and ineffective in 5 patients (efficacy rate of 88.1%) [30].

### 3. Moxibustion

Moxibustion is performed by transducing the heat from burning or ironing moxa or other drugs into the skin to warm the meridians, *qi*, and blood. Moxa is the most commonly used herb for moxibustion. In the treatment of insomnia, a moxa stick is mostly used and the main points are Baihui (GV 20), Zusanli (ST36), and Yongquan (KI1), according to the patient's constitution deficiency (Figure 3). Patients with "hot constitution" are not suitable for moxibustion. The best time to treat insomnia is when the patient has "cold" symptoms. An RCT of moxibustion for insomnia has shown that the treatment is as effective as estazolam medication [31], with the reported efficacy rate as high as 95% [32].

## 4. Combination Therapy

### 4.1. Acupuncture and Moxibustion

This combination therapy is used for some serious, prolonged, or refractory cases of insomnia. Acupoints are applied according to the patient's constitution deficiency. Acupuncture is performed until *qi* is achieved, and the needles are retained for 30 min, during which moxibustion is performed by placing a 2-cm burning moxa stick over the needle handle. When the moxa stick is completely burnt, the ash is cleaned and the needle is withdrawn. Some physicians treated 40 patients by this combination and achieved an efficacy rate of 77.5% [33]. Another



**Figure 3.** A lighted moxa stick for moxibustion.

research was to conduct a single-blind RCT of this combination therapy versus acupuncture alone and found that the efficacy of acupuncture with moxibustion is 87.7% and that of acupuncture only is 76.3% [34].

#### 4.2. Acupuncture and Moxibustion with *Tuina*

Acupuncture and moxibustion performed with *tuina* can influence activity of the cerebral cortex and regulate nervous function to restore balance without the side effects associated with sedatives. When performed in the head region, *tuina* can help capillary dilatation, increase cerebral blood flow, and improve cerebral blood circulation. It is usually performed before acupuncture and moxibustion. The patient sits or lies supine and either the head or the feet, the back or the abdomen, or a combination of these parts are massaged. For *tuina* on the head, one-finger pushing manipulation, wiping manipulation with both thumbs, and sweeping and arching-pushing manipulations are alternately performed along the distribution of the gallbladder channel on both sides. The efficacy rate was found to be over 95% for *tuina* on the head performed by five-finger grasping manipulation of the vertex to three-finger grasping manipulation of the suboccipital part in addition to acupuncture [35]. For *tuina* on acupoints of the feet, the reported efficacy rate is 96% [36].

#### 4.3. Acupuncture with Chinese Herbal Injection

Some TCM practitioners use injectors instead of silver needles for acupuncture. After achieving *qi*, 1 - 3 ml of Chinese herbs, usually gastrodine or salvianolic acid extracted from *Salvia miltiorrhiza*, is injected into the acupoints. This treatment is performed daily, with 10 days constituting one therapeutic course and a 3-day interval between courses. Shi *et al.* found that the efficacy rate after 2 courses in patients with insomnia was 95% [37].

#### 4.4. Electroacupuncture

In electroacupuncture (EA), conventional acupoints are used, but the needles are connected to the output terminals of an EA apparatus. Continuous waves at medium current frequency (e.g., 80 Hz) are used. The intensity is adjusted to induce slight muscular twitching (~1 - 3 mA) and lasts for 30 min. Continuous treatment over 10 days is considered one course. Four courses are performed in each patient with an interval of 3 days. A clinical trial has demonstrated the obvious therapeutic effect of EA on insomnia [38].

#### 4.5. Acupuncture with Medication or Psychotherapy

With the development of western medicine in China, TCM has been integrated with western medicine. In this field, insomnia is usually treated with a combination of herbs, acupuncture, estazolam medication, and psychotherapy, yielding an efficacy rate of over 90% [39] [40].

## 5. Special Acupuncture Methods

### 5.1. Needle-Rolling Acupuncture

Needle-rolling acupuncture is an old method based on acupuncture. It gently stimulates a larger area on the channels and collaterals where the 5 *zang Shu-Mu* points are located, strengthening functions of the *zang-fu* organs. Through the channels and collaterals, this stimulation also acts on the brain, regulating *yin*, *yang*, *qi*, and blood to treat insomnia. The spinal nerves form branches on both sides of the spine, and in the deep layer, the sympathetic trunk, sympathetic paravertebral ganglia, and gray and white ramus communicans join the spinal nerves. Therefore, large-area stimulation by needle-rolling therapy is likely to effectively adjust disturbed function of vegetative nerves and the microcirculatory system at the body surface (in the skin) as well as activate regulatory nerves of the corresponding internal organs. It may also influence the release of chemical mediators of the peripheral and central nervous systems, such as dopamine, noradrenalin, acetylcholine, somatotropin, and corticotrophin-releasing factor, thus inducing therapeutic effects.

In this method, the patient lies in the prone position. The operator uses the needle-rolling instrument in the following order: 1) rolling along the first line of the bladder channel from Feishu (BL 13) to Shenshu (BL 23); 2) rolling along the second line of the bladder channel from Dazhu (BL 11) to Zhishi (BL 52); and 3) rolling along the governor channel from Mingmen (GV 4) to Dazhui (GV 14). Needle rolling is performed quite slowly about 10 times, with the rolling force maintained at the patient's comfort level but sufficient to redden the skin (indicating smooth flow of *qi* and blood in the channel). Each session lasts 15 - 20 min. In a previous study, the treatment group received needle-rolling therapy once daily in the daytime, for 15 - 20 min per session, and 5 times a week with a one-day interval [41]. An RCT of the therapeutic effect on insomnia showed an efficacy rate of 82.2% in the needle-rolling group and 60.0% in the clonazepam medication group after 4 weeks, although no significant difference was noted after the 3-month follow-up. Regardless, the needle-rolling group had better life quality due to fewer side effects [42] [43].

### 5.2. Auricular Acupoint Plaster Therapy

According to TCM, the auricular surface mainly communicates with collateral channels of the inner organs and limbs. The shape of the auricle is like an inverted fetus, so the distribution of functional acupoints is similar to that of inverted fetal organs. In general, the auricular acupoints of the head and face are located at the earlobe, those of the upper limb are on the scaphoid, those of the trunk and lower limb are located on the helix and its foot, and the acupoints of the visceral organs are in the concha and its cavity (Figure 4).

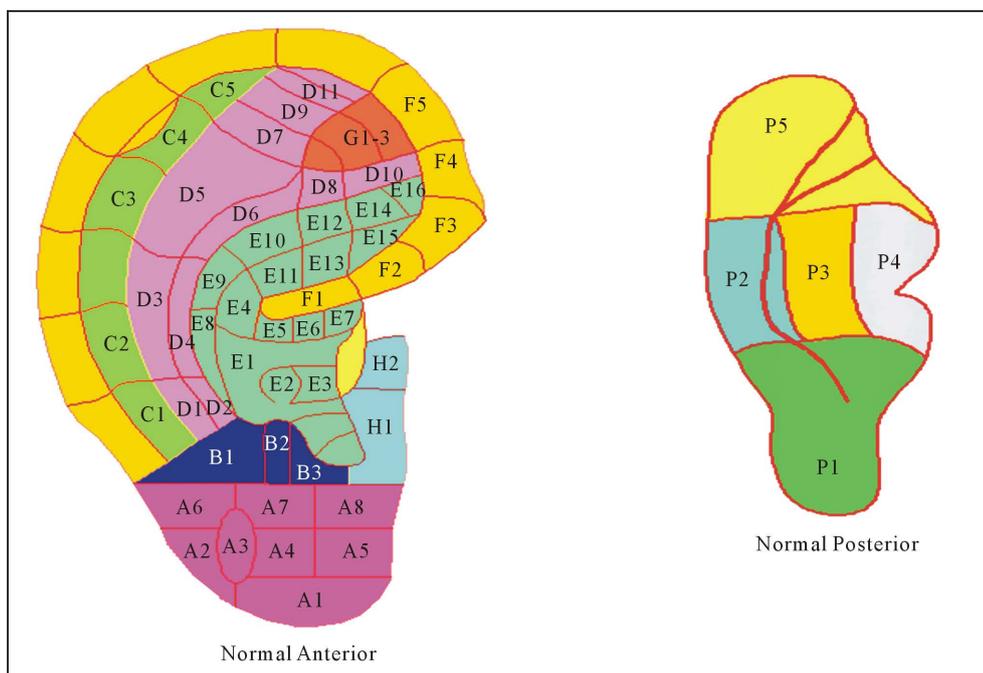
Auricular acupoints are applied to treat many diseases in several methods (e.g., acupuncture, moxibustion, phlebotomy, herbal plaster therapy, or their combinations). Auricular acupoint plaster therapy is most commonly used for insomnia, and the main auricular acupoints are ear-Shenmen, heart, mouth (also called "sleep-promoting point"), occiput, anterior lobe of forehead (also called "neurasthenia point"), and subcortex of forehead. Supplemental points are selected as follows: spleen for deficiency of the heart and spleen, kidney for disharmony between the heart and the kidney, liver for upward disturbance of liver-fire, gallbladder for deficiency of heart-*qi* and gallbladder-*qi*, and stomach for dysfunction of the stomach [44] [45]. Liu treated 40 cases and found the efficacy rate to be 90% [46].

### 5.3. Phlebotomy

Phlebotomy (bloodletting) has a long history and has been widely applied. To treat insomnia, acupoints on the ear are selected according to the patient's constitution deficiency. The ear is sterilized, a needle is used to prick the selected acupoint, the earlobe is gently squeezed to release 4 - 5 drops of blood, and the punctured point is pressed with a clean swab to stop bleeding. This procedure can be repeated twice a week, on alternate sides each time. Contraindications include bleeding disorders, anemia, hypotension, and pregnancy. Although phlebotomy is extensively performed in China, the method needs further research and summarization [47] [48].

### 5.4. Acupoint Catgut-Embedding Therapy

Acupoint catgut-embedding therapy integrates a variety of treatments including acupuncture, needle embedding, and tissue therapy. The method is based on acupuncture and involves implantation of an absorbable thread-like



**Figure 4.** The auricular acupoint graph. Area A (earlobe): A1, tonsil; A2, inner ear; A3, cheek; A4, eye; A5, vertical front; A6, jaw; A7, tongue; A8, teeth. Area B: B1, occiput; B2, temple; B3, forehead. Area C (periotic auriculae): C1, clavicle; C2, elbow; C3, shoulder; C4, wrist; C5, finger. Area D (antihelix): D1, cervical vertebra; D2, neck; D3, thoracic vertebra; D4, thorax; D5, lumbosacral vertebrae; D6, abdomen; D7, hip; D8, buttocks; D9, knee; D10, sciatic nerve; D11, ankle. Area E (concha auriculae): E1, lung; E2, heart; E3, trachea; E4, stomach; E5, cardia; E6, esophagus; E7, mouth; E8, spleen; E9, liver; E10, pancreas and gallbladder; E11, duodenum; E12, kidney; E13, small intestine; E14, bladder; E15, colon; E16, sacrum. Area F (helix): F1, middle ear; F2, rectum; F3, urethra; F4, external genital organs; F5, anus. Areas G1-3 (fossa triangularis auriculae): internal genitalia. Area H (tragus): H1, external nose; H2, throat and inner nose. Posterior auricular acupoints: P1, kidney; P2, liver; P3, spleen; P4, lung; P5, heart.

protein, such as catgut, into 3 - 5 corresponding line-standing acupoints. Both acupuncture and catgut-embedding therapy can improve sleep quality, but catgut-embedding therapy is less time consuming and more convenient, and ensures longer stimulation [49] [50].

## 6. Conclusion

Most clinical trials of insomnia have shown that, compared with no treatment, sham acupuncture, or medication, acupuncture significantly improves sleep quality and duration, and the efficacy rate varies from 70% to 98% [7] [25] [26]. The combination of acupuncture and other TCM interventions appears to be more effective than individual interventions. The beneficial effects of acupuncture may have been overvalued in some trials, because of small sample size, nonstrict inclusion and exclusion, flawed methodology, and short follow-up. Moreover, conventional tools such as the Pittsburgh Sleep Quality Index, Athens Insomnia Scale, Insomnia Severity Index, and Epworth Sleepiness Scale were seldom used to evaluate the results. These scales have inherent problems, such as subjectivity, lack of standardization and generalizability, and limited applicability of the Life Quality Scale [50]. Clinical trials with high methodological quality, especially RCTs, are needed to validate the efficacy of acupuncture, moxibustion, and their combinations for insomnia.

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