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Intervention Effect of Umbilical Acupuncture Combined with Body Acupuncture on Sleep Quality and Traditional Chinese Medicine Syndromes in Patients with Insomnia of Liver Depression Transforming into Fire Type

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Abstract: *Objective:* To evaluate the intervention effect of umbilical acupuncture combined with body acupuncture on sleep quality and traditional Chinese medicine (TCM) syndromes in patients with insomnia of liver depression transforming into fire type. *Methods:* A total of 100 patients were randomly divided into the control group (conventional acupuncture) and the treatment group (umbilical acupuncture combined with body acupuncture). Both groups received treatment 3 times a week for 4 consecutive weeks. The Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI) and TCM syndrome score were used for efficacy evaluation. *Results:* After treatment, the total PSQI score, ISI score and TCM syndrome score in the treatment group were significantly better than those in the control group ($P < 0.05$). The total effective rate of sleep quality in the treatment group reached 96.00%, and the total effective rate of TCM syndromes was 94.00%, both of which were higher than those in the control group ($P < 0.05$). *Conclusion:* Umbilical acupuncture combined with body acupuncture can significantly improve the sleep quality and TCM syndromes of patients with insomnia of liver depression transforming into fire type, with definite curative effect and simple operation, which has good clinical application value.
Keywords: umbilical acupuncture; body acupuncture; insomnia of liver depression transforming into fire type; sleep quality; traditional Chinese medicine syndromes

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1. Introduction

With the acceleration of modern life rhythm and the increase of mental pressure, the incidence of insomnia continues to rise. Epidemiological surveys show that the prevalence of insomnia among adults in China reaches 38.2%, among which the liver depression transforming into fire pattern accounts for more than 40% of insomnia patients[1]. Long-term insomnia not only affects daytime function, but also increases the risk of various chronic diseases. Although western medicine can relieve symptoms in the short term, it is easy to cause dependence, drug resistance and adverse reactions. TCM acupuncture therapy is widely used due to its good curative effect and few side effects, but

conventional acupuncture has limited effect on some patients[2]. Umbilical acupuncture is a characteristic therapy combining I Ching theory, basic TCM theory and holographic theory, which has shown potential in the treatment of insomnia. However, there is a lack of large-scale standardized studies targeting the liver depression transforming into fire pattern, and the operation standards have not been unified[3]. In this study, a randomized controlled trial was conducted to evaluate the efficacy of umbilical acupuncture combined with body acupuncture on insomnia of this pattern, aiming to provide evidence-based basis and formulate standardized protocols.

2. Materials and Methods

2.1. General Information

This study enrolled a total of 100 patients with insomnia of liver-stagnation transforming into fire type from the Preventive Treatment Center of the First Affiliated Hospital of Chongqing College of Traditional Chinese Medicine between August 2024 and July 2026, who were taken as research subjects. They were randomly divided into a control group and a treatment group using the random number table method, with 50 cases in each group. Baseline data of the two groups were compared. In the control group, there were 22 males and 28 females; patients aged from 19 to 68 years, with a mean age of 43.25 years (standard deviation = 8.67 years); disease duration ranged from 3 months to 10 years, with a mean of 4.12 years (standard deviation = 2.35 years). In the treatment group, there were 24 males and 26 females; patients aged from 18 to 70 years, with a mean age of 42.86 years (standard deviation = 8.92 years); disease duration ranged from 3 months to 11 years, with a mean of 4.35 years (standard deviation = 2.48 years). There were no statistically significant differences between the two groups in general data including gender, age and disease duration ($P > 0.05$), indicating comparability between groups. To ensure ethical compliance, this study was pre-approved by the hospital's Ethics Committee, and all enrolled patients signed informed consent forms.

Western medicine diagnostic criteria: Refer to the diagnostic criteria for insomnia in the Chinese Guidelines for the Diagnosis and Treatment of Adult Insomnia (2017 Edition): ① Presence of abnormal sleep symptoms such as difficulty falling asleep, sleep maintenance difficulty and early awakening; ② Presence of daytime functional impairment such as fatigue, inattention and emotional irritability; ③ The above symptoms cannot be simply explained by insufficient sleep time or poor sleep environment; ④ Cannot be better explained by other sleep disorders.

If a patient tosses and turns, unable to fall asleep, exhibits irritability and frequent outbursts of anger, accompanied by distending discomfort in the chest and hypochondria, distending headache, flushing complexion, conjunctival congestion, bitter taste in the mouth, constipation, dark yellow urine, a slightly red tongue with thin yellow coating, and a string-rapid pulse, this condition is classified as insomnia due to liver-stagnation transforming into fire. Its syndrome differentiation criteria are derived from the Diagnostic and Therapeutic Standards for Traditional Chinese Medicine Diseases and Syndromes (ZY/T001.1-94).

Inclusion criteria: ① Meeting the above western medicine and TCM diagnostic criteria, with syndrome differentiation of liver depression transforming into fire pattern; ② Pittsburgh Sleep Quality Index (PSQI) score > 7 points and Insomnia Severity Index (ISI) score > 7 points; ③ Aged 18-70 years, regardless of gender; ④ No severe heart, liver, kidney and other organ diseases or mental diseases; ⑤ Not taking sedative-hypnotics and antipsychotic drugs in the past 2 weeks; ⑥ Voluntarily participating in this study and signing the informed consent form.

Exclusion criteria: ① Those who do not meet the inclusion criteria; ② Pregnant or lactating women; ③ Those with infection, skin lesions or scars in the umbilical region; ④ Those with a history of acupuncture syncope; ⑤ Those receiving other treatments that may affect sleep; ⑥ Those with poor compliance who cannot complete the

course of treatment.

2.2. Treatment Methods

The control group was given conventional acupuncture treatment. Acupoint selection: Zhaohai (KI6), Shenmai (BL62), Shenmen (HT7), Sanyinjiao (SP6), Anmian (EX-HN22), Sishencong (EX-HN1), Taichong (LR3), Hegu (LI4). The location of acupoints refers to the National Standard of the People's Republic of China. Location of Acupoints (GB12346-90). Operation method: The patient took the supine position, and the skin of the acupuncture site was routinely disinfected. Disposable sterile acupuncture needles (0.25mm × 40mm, Changchun Aikang Medical Devices Co., Ltd.) were used, with a needling depth of 0.5-0.8 cun. After qi arrival, reducing method (light insertion and heavy lifting, heavy force when twisting the thumb backward) was applied to Shenmai (BL62), reinforcing method (heavy insertion and light lifting, heavy force when twisting the thumb forward) was applied to Zhaohai (KI6), and neutral reinforcing-reducing method was applied to the other acupoints, with a twisting amplitude of about 180°, a frequency of 120 times per minute, needling manipulation for 1-2 minutes, and retaining the needles for 30 minutes.

The treatment group was given umbilical acupuncture combined with body acupuncture. Body acupoints selected: Hegu (LI4), Taichong (LR3), Yintang (EX-HN3), Shenmen (HT7), Zhaohai (KI6), and the operation method was the same as that of the control group. Umbilical acupuncture treatment: The patient took the supine position, exposed the umbilical region, and routinely disinfected the skin around the umbilicus. Disposable sterile acupuncture needles (0.25mm×25mm) were used, with the umbilical core as the center, and the needles were inserted horizontally and twisted into the umbilical wall around in the order of Kan, Zhen, Li and Kun positions, with a needling depth of 0.5-0.8 cun. No manipulation was performed after insertion, and the needles were retained for 30 minutes.

Patients in both groups were treated 3 times a week, 30 minutes each time, for 4 consecutive weeks as a course of treatment, with a total of 12 treatments. During the treatment period, patients were instructed to have a regular schedule, avoid staying up late, keep a good mood, and avoid spicy and irritating food.

2.3. Observation Indicators

Sleep quality: Evaluated by the Pittsburgh Sleep Quality Index (PSQI), which includes 7 dimensions: sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of hypnotic drugs and daytime dysfunction. Each dimension is scored 0-3 points, with a total score of 0-21 points. The higher the score, the worse the sleep quality[4]. The two groups were evaluated before treatment and after 4 weeks of treatment respectively.

Insomnia severity: Evaluated by the Insomnia Severity Index (ISI), which consists of 7 items, each scored 0-4 points, with a total score of 0-28 points. The higher the score, the more severe the insomnia. The two groups were evaluated before treatment and after 4 weeks of treatment respectively.

TCM syndrome score: Evaluated by the TCM Symptom Score Scale for Insomnia of Liver Depression Transforming into Fire Pattern. The main symptoms include difficulty falling asleep, restless sleep and early awakening, which are scored 2, 4 and 6 points for mild, moderate and severe respectively; the secondary symptoms include irritability, chest tightness and hypochondriac pain, headache and flushed face, bitter taste in the mouth, constipation and yellow urine, which are scored 0, 1, 2 and 3 points for none, mild, moderate and severe respectively. The higher the total score, the more severe the TCM syndrome[5]. The two groups were evaluated before treatment and after 4 weeks of treatment respectively.

Efficacy evaluation criteria:

(1) Sleep quality efficacy

Refer to Reliability and Validity of the Pittsburgh Sleep Quality Index, the efficacy was evaluated according to

the reduction rate of PSQI score. Reduction rate = (pre-treatment score - post-treatment score) / pre-treatment score × 100%. Cure: reduction rate ≥ 75%; Markedly effective: 50% ≤ reduction rate < 75%; Effective: 25% ≤ reduction rate < 50%; Ineffective: reduction rate < 25%. Total effective rate = (number of cured + markedly effective + effective cases) / total number of cases × 100%.

(2) TCM syndrome efficacy

The Nimodipine method was used to evaluate the efficacy according to the reduction rate of TCM syndrome score. Reduction rate = (pre-treatment score - post-treatment score) / pre-treatment score × 100%. Clinical cure: score reduction ≥ 95%; Markedly effective: 70% ≤ score reduction < 95%; Effective: 30% ≤ score reduction < 70%; Ineffective: score reduction < 30%. Total effective rate = (number of clinical cured + markedly effective + effective cases) / total number of cases × 100%.

2.4. Statistical Methods

Data analysis was performed using SPSS 22.0. Measurement data conforming to a normal distribution were expressed as mean ± standard deviation ($\bar{x} \pm s$). The paired-samples t-test was used to examine changes within the same group before and after intervention, while the independent-samples t-test was adopted to compare differences between two independent groups. Enumeration data were presented as frequencies and percentages (%), and inter-group comparisons were conducted via the χ^2 test. For ranked data, non-parametric rank-sum tests were used instead of parametric tests. Finally, $P < 0.05$ was defined as the threshold for statistically significant differences.

3. Results

3.1. Comparison of PSQI Scores Between the Two Groups Before and After Treatment

Pre-treatment assessment showed no statistically significant differences in the total score of sleep quality and scores of each dimension between the two groups ($P > 0.05$). Data in **Table 1** indicated that after intervention, the total PSQI score and each factor score decreased significantly in both groups, with statistically significant differences before and after treatment ($P < 0.05$). Meanwhile, all scores in the treatment group were lower than those in the control group, showing significant inter-group differences ($P < 0.05$).

Table 1. Comparison of PSQI Scores Between the Two Groups Before and After Treatment (points, ± s)

Group	Number of cases	Time	Sleep quality	Sleep latency	Sleep duration	Sleep efficiency	Sleep disturbance	Hypnotic drugs	Daytime dysfunction	Total score
Control group	50	Pre-treatment	2.36 ± 0.52	2.41 ± 0.58	2.28 ± 0.61	2.15 ± 0.55	1.86 ± 0.47	0.52 ± 0.21	2.60 ± 0.63	14.18 ± 2.41
		Post-treatment	1.52 ± 0.45	1.68 ± 0.51	1.45 ± 0.48	1.32 ± 0.42	1.21 ± 0.38	0.35 ± 0.18	1.33 ± 0.49	7.86 ± 1.53
Treatment group	50	Pre-treatment	2.42 ± 0.55	2.38 ± 0.56	2.32 ± 0.63	2.18 ± 0.57	1.89 ± 0.49	0.54 ± 0.23	2.62 ± 0.65	14.25 ± 2.36
		Post-treatment	0.85 ± 0.32	0.92 ± 0.35	0.78 ± 0.29	0.65 ± 0.26	0.72 ± 0.25	0.12 ± 0.08	0.98 ± 0.33	5.12 ± 1.28
P value			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

3.2. Comparison of ISI Scores Between the Two Groups Before and After Treatment

Before treatment, there was no statistically significant difference in the ISI score between groups ($P > 0.05$). After

intervention, scores of both groups decreased, with significant differences compared with their respective baselines ($P < 0.05$). Moreover, the treatment group showed a greater reduction and had lower scores than the control group ($P < 0.05$). See **Table 2** for details.

Table 2. Comparison of ISI Scores Between the Two Groups Before and After Treatment (points, ± s)

Group	Number of cases	Pre-treatment	Post-treatment	*P* value
Control group	50	16.28 ± 2.21	9.47 ± 1.62	< 0.05
Treatment group	50	16.32 ± 2.15	6.25 ± 1.36	< 0.05
P value		> 0.05	< 0.05	

3.3. Comparison of TCM Syndrome Scores Between the Two Groups Before and After Treatment

Pre-treatment assessment showed that the baseline levels of Traditional Chinese Medicine (TCM) syndrome scores were comparable between the two groups ($P > 0.05$). After intervention, the syndrome scores in both groups decreased significantly compared with their respective baselines ($P < 0.05$), with a more marked reduction in the treatment group than in the control group ($P < 0.05$). Relevant data are summarized in **Table 3**.

Table 3. Comparison of TCM Syndrome Scores Between the Two Groups Before and After Treatment (points, ± s)

Group	Number of cases	Pre-treatment	Post-treatment	*P* value
Control group	50	18.49 ± 3.18	9.68 ± 1.76	< 0.05
Treatment group	50	18.56 ± 3.24	5.32 ± 1.45	< 0.05
P value		> 0.05	< 0.05	

3.4. Comparison of Clinical Efficacy Between the Two Groups

In terms of sleep quality, 48 out of 50 patients (96.00%) showed efficacy in the treatment group, compared with only 39 out of 50 (78.00%) in the control group, with a statistically significant inter-group difference ($P < 0.05$). For the improvement of traditional Chinese medicine (TCM) syndromes, 47 out of 50 patients (94.00%) achieved efficacy in the treatment group, which was superior to 38 out of 50 (76.00%) in the control group, and the difference was also significant ($P < 0.05$). Relevant data are summarized in **Table 4**.

Table 4. Comparison of Clinical Efficacy Between the Two Groups [cases (%)]

Group	Number of cases	Sleep quality efficacy					TCM syndrome efficacy				
		Cured	Markedly effective	Effective	Ineffective	Total effective rate	Clinical cure	Markedly effective	Effective	Ineffective	Total effective rate
Control group	50	12 (24.00)	15 (30.00)	12 (24.00)	11 (22.00)	39 (78.00)	10 (20.0)	14 (28.00)	14 (28.00)	12 (24.00)	38 (76.00)
Treatment group	50	25 (50.00)	16 (32.00)	7 (14.00)	2 (4.00)	48 (96.00)	22 (44.0)	15 (30.00)	10 (20.00)	3 (6.00)	47 (94.00)
χ^2 value					7.162					6.353	
P value					< 0.05					< 0.05	

4. Discussion

In TCM theory, insomnia belongs to the category of "bumei", and its core pathogenesis is exuberance of yang and deficiency of yin, as well as imbalance of yin and yang. Among them, insomnia of liver depression transforming into fire pattern is mostly caused by emotional distress, leading to liver qi stagnation, which transforms into fire over time, and the fire disturbs the heart-mind, resulting in symptoms such as restlessness and difficulty falling asleep, irritability, headache and flushed face, red eyes and bitter taste in the mouth, chest and hypochondriac distending pain, constipation and yellow urine. Jingyue's Complete Works pointed out: "When the spirit is at peace, one sleeps; when the spirit is not at peace, one does not sleep", emphasizing the importance of a peaceful heart-mind for sleep.

Conventional acupuncture treatment often selects acupoints such as Shenmen (HT7), Sanyinjiao (SP6), Taichong (LR3) and Hegu (LI4). Shenmen (HT7) calms the heart and tranquilizes the mind, Sanyinjiao (SP6) harmonizes the liver, spleen and kidney meridians, Taichong (LR3) soothes the liver and purges fire, and Hegu (LI4) combined with Taichong (LR3) forms the "Siguan Points", which can regulate qi and blood throughout the body. In addition, Zhaohai (KI6) and Shenmai (BL62) connect with the Yin Heel Vessel and Yang Heel Vessel respectively, which help to harmonize yin and yang and improve sleep. Studies have shown that conventional acupuncture can effectively reduce the PSQI, ISI and TCM syndrome scores of patients.

Umbilical acupuncture is a characteristic therapy that combines I Ching theory, basic TCM theory and holographic theory, and performs acupuncture treatment around the navel (i.e., Shenque (CV8) point). Shenque (CV8) point is the foundation of innate endowment and the root of acquired constitution, and is closely connected with the five zang-organs, six fu-organs and twelve meridians. In this study, four positions were selected: Kan (Kidney, Water), Zhen (Liver, Wood), Li (Heart, Fire) and Kun (Spleen, Earth). Kan belongs to water and Zhen belongs to wood, so Kan and Zhen nourish water to enrich wood; Li belongs to fire, and Li and Kun clear heat and purge fire. At the same time, Zhen, Li and Kun form the "Spleen-strengthening Three Needles", which soothe the liver and regulate qi, invigorate the spleen and replenish qi. The four positions work together to achieve the effects of soothing the liver and purging fire, calming the heart and tranquilizing the mind.

The results showed that the umbilical acupuncture combined with body acupuncture group was significantly better than the simple body acupuncture group in improving sleep quality and relieving TCM syndromes, with a higher total effective rate. Its advantages may lie in: First, the umbilical region is rich in nerve endings, which can regulate autonomic nerve function and balance the excitation and inhibition of the brain; Second, umbilical acupuncture and body acupuncture have a synergistic effect, which harmonizes the qi and blood of zang-fu organs as a whole; Third, the operation is simple and the pain is mild, so the patient compliance is high.

This study still has limitations, such as small sample size, short observation period, lack of long-term follow-up and discussion on other syndromes. In the future, it is necessary to expand the sample size, extend the follow-up period and extend to different syndromes to comprehensively verify the clinical value of umbilical acupuncture. In general, umbilical acupuncture combined with body acupuncture has definite curative effect, is safe and feasible for insomnia of liver depression transforming into fire pattern, and has good promotion prospects.

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Disclosure statement

The author declares no conflict of interest.

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