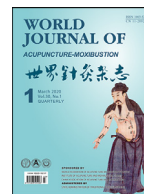




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Clinical Research

Intradermal needle at auricular acupoint for insomnia: A randomized controlled trial

耳穴皮内针治疗失眠:随机对照试验

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ABSTRACT

Objective: To compare whether there is clinical effects difference between intradermal needle at auricular acupoint and conventional acupuncture for insomnia.**Methods:** A total of 70 patients were randomly assigned into an intradermal needle group and an acupuncture group, 35 patients in each group. Finally 34 patients completed the study in the intradermal needle group, 32 patients completed validly in the acupuncture group. The patients in the intradermal needle group received intradermal needle therapy, in which the needle was imbedded subcutaneously at auricular acupoint: Shénmén (神门 TF₄), Pízhìxià (皮质下 AT₄), Zhěn (枕 AT₃), Xīn (心 CO₁₅), and back-shu point: Gānshū (肝俞 BL₁₈), Xīnshū (心俞 BL₁₅), Shènsū (肾俞 BL₂₃) and Píshū (脾俞 BL₂₀), as well as Ānmǐn (安眠 EX-HN₁₈) retained for 2 days, and the patient would received a second therapy every other day, one course of treatment consisted of 3 times of treatment. The patients in the acupuncture group received a conventional acupuncture therapy, in which Zhàohǎi (照海 KI₆), Shēnmài (申脉 BL₆₂), Shénmén (神门 HT₇), Sānyīnjiāo (三阴交 SP₆), EX-HN₁₈, Sìshéncōng (四神聪 EX-HN₁) were punctured conventionally with needle and the needle was retained for 30 min, once per day, one course of treatment consisted of 5 times of treatment. Before and after the 4 courses of treatment, Pittsburgh sleep quality index (PSQI) of the patients in the two groups were evaluated, and their clinical therapeutic effects were evaluated too.**Results:** There were no statistically significant differences of PSQI scores and clinical therapeutic effects of the patients with insomnia in two groups after treatment (both $P > 0.05$).**Conclusions:** Intradermal needle at auricular acupoint and conventional acupuncture therapy have comparable clinical therapeutic effects.

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Insomnia is an unsatisfactory condition in sleep quality and/or quantity problem, which may persist for a considerable long time, bringing great trouble on patients' life and work [1]. In clinical treatment, acupuncture is an effective method for insomnia. However, many patients cannot adhere to frequent acupuncture treatments clinically, due to the influence by objective factors. Therefore, it requires a therapy mode with flexible treatment time and long-lasting therapeutic effects. Intradermal needle at auricular acupoint can satisfy such requirements. However, it requires further research whether intradermal needle at auricular

acupoint and conventional acupuncture therapy have comparable therapeutic effects in treatment of insomnia. This study explored comparison of therapeutic effects of intradermal needle at auricular acupoint and conventional acupuncture therapy. Now it was reported as follows.

Clinical data

General data

By random number table method, a total of 70 patients were randomly assigned in a ratio of 1:1 into an intradermal needle group and an acupuncture group, there were 35 patients in each

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group, who paid a visit to the Department of Acupuncture and Moxibustion, Hubei Provincial Hospital of Traditional Chinese Medicine from May 1, 2018 to May 1, 2019. Intradermal group: the patients included 16 males and 19 females, aged 18 years old to 52 years old, the average age of age (35.63 ± 3.32) years, course of disease between 6 months to 44 months, the average age of course of disease of 16.5 ± 3.9 months. Acupuncture group: the patients included 14 males and 21 females, aged 19 years old to 50 years old, the average age of (35.78 ± 3.05) years old, course of disease between 6 month to 39 months, the average course of disease of (16.1 ± 4.5) months. There were no statistically significant differences (all $P > 0.05$) of genders, ages and course of disease in the patients between the two groups.

Diagnostic criteria

It is evaluated in accordance with the diagnostic criteria for insomnia in the *Chinese Classification and Diagnostic Criteria of Mental Diseases (Version 3)* (CCMD-3) [2], i.e., unsatisfactory sleep quality mainly due to sleep disorder. Other symptoms are secondary from insomnia, including difficulty in falling asleep, insomnia-middle, difficulty staying asleep, dreaminess, early morning awakening, difficulty in falling asleep after waking up, and discomfort and fatigue after waking up, or daytime drowsiness, etc. The above sleep disorders occur at least 3 times per week, and persist for more than 1 month. Insomnia result in significant distress or decreased mental activity efficiency, or hinder social function. Secondary insomnia due to somatic disease or mental disorder symptoms is excluded.

Inclusion criteria

(1) Comply with the diagnostic criteria for insomnia. (2) Aged 18 years old to 55 years old. (3) Patients who do not take a sedative and hypnotic medication orally or do not receive any other sleep-improving therapy in the past one week. (4) Patients who are willing to sign the informed consent form.

Exclusion criteria

(1) Patients with clearly defined diagnosis of mental disorder and/or who are taking orally anxiolytic or antidepressive drugs. (2) Patients with secondary insomnia caused by other somatic diseases, such as cough and pain. (3) Alcoholics. (4) Patients with concurrent severe mental diseases. (5) Pregnant or breast-feeding women. (6) Patients with skin damage at the treatment site.

Exclusion and drop-out criteria

Patients who withdraw spontaneously from or require proactively to terminate the trial, with poor compliance who do not actively cooperate for treatment, and the patients who do not complete the whole treatment in the study.

Therapeutic method

Intradermal needle group

Acupoints: auricular acupoints were Shénmén (神门 TF₄), Pízhìxià (皮质下 AT₄), Zhěn (枕 AT₃), Xīn (心 CO₁₅), and back-shu points were Gānshū (肝俞 BL18), Xīnshū (心俞 BL15), Shènshū (肾俞 BL23) and Píshū (脾俞 BL20), as well as Ānmǐán (安眠 EX-HN18).

Manipulation: press-needles in 0.20 mm × 0.60 mm (used for auricular acupoints) and 0.20 mm × 1.5 mm (used for acupoints on neck and back) (Pyonex manufactured by Seirin Co., Ltd., Japan) were used. After locality disinfected routinely, the needle handle

was clamped by a pair of forceps, aimed at the acupoints, and was inserted perpendicularly, so that the annular needle handle was left evenly in the skin and fixed. After retained in the skin for 2 days, the press-needle was removed by the doctor and disinfected. The patients received the second treatment every other day, one course of treatment consisted of 3 times of treatment, for 4 courses of treatment in total. Here, intradermal needle at auricular acupoint was carried out to one side ear per time, and two sides were used alternately. The patient was advised to avoid water at the needle-imbedded site for prevention from infection. With more sweat in summer, the needle-imbedded site should be examined for whether there was skin redness due to sweating. Any redness or pain should be examined in time. The needle should be removed by the doctor who does the manipulation if the patient got infection. If pain occurred during needle-imbedding, inflammation would occur possibly, then the needle should be removed by the doctor responsible for the operation. If an infection occurred at the needle-imbedded site, then it should be surgical dressed routinely.

Acupuncture group

Acupoints in accordance with the reference [3]: Zhàohǎi (照海 KI6), Shēnmài (申脉 BL62), Shénmén (神门 HT7), Sānyīnjiāo (三阴交 SP6), Ānmǐán (安眠 EX-HN18), Sishéncōng (四神聪 EX-HN1). Manipulation: the acupoints were disinfected routinely. The 0.35 mm × 40 mm disposable filiform needles (manufactured by Suzhou Tianxie Acupuncture Devices Co., Ltd.) were used to insert transversely at EX-HN1, insert perpendicularly at HT7, KI6, BL62, SP6 and EX-HN18 to a depth of 25 mm to 40 mm, for *deqi* as aching pain, numbness and distending sensations, using even reinforcing and reducing manipulations. The needles were retained for 30 min. The patients were given treatment once per day, for 4 courses of treatment in total, one course of treatment consisted of 5 times of treatment.

Observation of therapeutic effects

Observation indicators

(1) Pittsburgh sleep quality index (PSQI)

The scores of PSQI was recorded before and after treatment. PSQI included self-evaluated items and items evaluated by another person. The total score of PSQI was 0 point to 21 points. If the total score was >8 points, it suggested that the patient had sleep disorder. The higher the score was, the poorer the sleep quality was.

(2) Therapeutic effect

Criteria for therapeutic effects

Refer to the criteria for evaluation of therapeutic effects for insomnia in the *Guideline for Clinical Research of New Drugs in Traditional Chinese Medicine* [4], issued by the Ministry of Public Health of the People's Republic of China. Clinically recovered: sleep time was recovered to normal or sleep time at night was more than 6 h, sleep was deep, and the patient was energetic after wakeup. Markedly effective: sleep condition was improved obviously, sleep time was increased by more than 3 h than before, and the depth of sleep was increased. Effective: the symptoms were relieved, and sleep time was increased by less than 3 h than before. Ineffective: after treatment, insomnia was not improved obviously or was exacerbated on the contrary.

Table 1
Comparison of PSQI scores in insomnia patients between the two groups before and after treatment (Mean \pm SD, score)

Groups	Cases	Time points	Sleep quality	Sleep latency	Sleep latency	Sleep efficiency	Sleep disorder	Hypnotic drug	Daytime dysfunction	PSQI total score
Intradermal needle group	34	Before treatment	2.32 \pm 0.68	2.53 \pm 0.66	2.56 \pm 0.61	2.50 \pm 0.75	2.50 \pm 0.67	2.32 \pm 0.81	2.44 \pm 0.82	17.15 \pm 4.81
		After treatment	1.53 \pm 0.82 ^a	1.62 \pm 0.82 ^a	1.44 \pm 0.82 ^a	1.47 \pm 0.83 ^a	1.50 \pm 0.83 ^a	1.47 \pm 0.86 ^a	1.38 \pm 0.82 ^a	10.35 \pm 5.66 ^a
Acupuncture group	32	Before treatment	2.41 \pm 0.80	2.44 \pm 0.76	2.50 \pm 0.62	2.50 \pm 0.76	2.41 \pm 0.76	2.53 \pm 0.72	2.47 \pm 0.72	17.28 \pm 4.98
		After treatment	1.56 \pm 0.80 ^a	1.50 \pm 0.76 ^a	1.62 \pm 0.75 ^a	1.59 \pm 0.80 ^a	1.60 \pm 0.84 ^a	1.50 \pm 0.72 ^a	1.62 \pm 0.87 ^a	10.93 \pm 5.32 ^a

Notes:

^a Compared with those before treatment as same group, $P < 0.05$.

Statistics analysis

Data processing and analysis were carried out by SPSS 20.0 statistical software. Measurement data were expressed as Mean \pm SD. If they were with normal distribution and homogeneity of variance as calibrated, then inter-group comparison was carried out by two independent sample *t*-test, and intra-group comparison was carried out by paired sample *t*-test. If they did not comply with normal distribution, then rank sum test or other test methods were used. Enumeration data were expressed as cases, and were compared by *Chi* square test. Here, ranked data were compared by rank sum test. If $P < 0.05$, it was considered that there were statistically significant differences.

Treatment results

In the intradermal group, 1 patient was dropped out due to sudden attack of cerebral hemorrhage, and 34 patients completed the study validly. In the acupuncture group, 1 patient was dropped out as the patient went to hometown in winter vacation, 1 patient was dropped out due to going out and 1 patient was excluded due to incomplete data. Finally, 32 patients completed the study validly.

Comparison of PSQI scores in insomnia patients between the two groups before and after treatment

Through comparison, there were no statistically significant differences of the total scores of PSQI and scores of 7 items of the insomnia patents between the two groups before treatment (all $P > 0.05$). The scores of 7 items of sleep quality, sleep latency, sleep time, sleep efficiency, sleep disorder, hypnotic drug, and daytime dysfunction, as well as the total score of PSQI of the patients after treatment were decreased than those before treatment in both groups, and there were statistically significant differences (all $P < 0.05$). Through comparison, there were no statistically significant differences of the total score of PSQI, and scores of 7 items after treatment between the two groups (all $P > 0.05$). See Table 1 for details.

Comparison of clinical therapeutic effects in insomnia patients between the two groups

In the intradermal needle group, 13 patients were recovered, 7 patients achieved markedly effective response, 9 patients achieved effective, and 5 patients showed ineffective response. The total effective rate was up to 85.29%. In the acupuncture group, 12 patients were recovered, 6 patients achieved markedly effective response, 10 patients achieved effective, and 4 patients showed ineffective response. Finally, the total effective rate was up to 87.50%. There were no statistically significant differences of total effective rates between the two groups ($P > 0.05$) Table 2.

Discussion

Insomnia is a very common disease, clinically characterized by difficulty in falling in asleep, easy awakening after sleep, and insufficient sleep time. As insomnia patients cannot maintain normal

sleep state, it produces serious influences on patients' daily life and work [5]. From current treatment of insomnia, the treatment of western medicine is mainly based on western drugs, such as sedative hypnotic drugs and antidepressive drugs. However, due to long course of disease, if insomnia patients are administered with western drugs for a long term, drug dependence and side effects may occur easily, and the therapeutic effects would become gradually poor. Traditional Chinese medicine (TCM) has unique advantages in treatment of the disease, and acupuncture has well-established therapeutic effects in treatment of insomnia [6]. This study compared treatment of insomnia by intradermal needle with conventional acupuncture, and found that there were no statistically significant differences of therapeutic effects between both of them, demonstrating that intradermal needle has well-established therapeutic effects in treatment of insomnia. What is more, compared with acupuncture, intradermal needle has unique advantages and characteristics in treatment of insomnia.

The intradermal needle at auricular acupoint is a therapy produced on the basis of acupoint theory and cutaneous region theory of the acupuncture and moxibustion. The therapeutic method of "being static for a long retention" is recorded in the 27th chapter in *Sùwèn* (《素问》 *Basic Questions*). The intradermal needle is based on this method, to produce intradermal stimulation and carry out long-time retention of the needle. The intradermal needle at auricular acupoint produces mild and long-lasting stimulation at auricular acupoint, which is transmitted into human body by acupoints and meridians and collaterals, to "dredge its blood and *qi*, make them smooth", to regulate functions of meridians and collaterals and *zang-fu* organs, and achieve purposes of treating disease, and is applicable for some chronic, refractory diseases (such as insomnia) requiring long-term retention of the needle.

For pathogenesis of insomnia, it is presently considered that insomnia is produced due to decreased inhibitory effects and/or increased facilitation effects of neurophysiological functions. Both intradermal needle imbedding at auricular acupoint and needle embedding at back-*shu* acupoints can produce bidirectional benign regulating effects and improve neurophysiological functions, to give play to treating effects [7]. Insomnia belongs to the sleeplessness category of TCM, mostly due to liver constraint transforming into *fire* from binding depression of liver *qi*, and phlegm-heat harassing the interior, or due to *yin-yang* disharmony, *yang* not entering *yin*, and mind dystrophy from prolonged disease and poor health, and heart blood deficiency and depletion. The occurrence of insomnia is closely related with heart, liver, spleen, and kidney.

For acupoints, those used in the acupuncture group were KI6, BL62, HT7, SP6, EX-HN18, EX-HN1. KI6 and BL62 can regulate *yin* and *yang* heel vessels. HT7 is the acupoint of the hand-*shaoyin* heart meridian, and can tonify heart *qi* and pacify the mind. SP6 may fortify the spleen and tonify blood, regulate liver and tonify kidney, and tranquilize and sedate the mind. EX-HN18 is an empiric effective acupoint for treatment of insomnia. EX-HN1 can tranquilize and allay excitement, and has significant insomnia-improving effects. The acupoints used in the intradermal needle group were auricular acupoint TF₄, AT₄, AT₃, CO₁₅, and back-*shu*

Table 2
Comparison of clinical therapeutic effects in insomnia patients between the two groups (cases)

Groups	Cases	Recovered	Markedly effective	Effective	Ineffective	Total Effective Rate (%)
Intradermal needle group	34	13	7	9	5	85.29
Acupuncture group	32	12	6	10	4	87.50

acupoints BL15, BL18, BL20 and BL23, as well as EX-HN18. On one hand, the twelve meridians converge at ear. Auricular acupoints are sites for mutual communication between the auricular surface and the *zang-fu* organs and meridians and collaterals of human body. Therefore, stimulation to auricular acupoints can regulate the *zang-fu* organs. Auricular acupoint TF₄ is a key acupoint to tranquilize and allay excitement [8–9]. AT₄ and AT₃ are key acupoints to regulate cerebral cortex function, TF₄, and AT₄ are counterpart acupoints, CO₁₅ is the responsive point of heart at auricle. The heart governs the mind and the heart stores the spirit. So CO₁₅ may be used to calm the heart and tranquilize the mind. Concurrent use of several auricular acupoints may have effects of tranquilizing and allaying excitement, the same effects as those by acupuncture in treatment insomnia. However, the intradermal needle group also utilized back-*shu* acupoints for needle imbedding. Back-*shu* acupoints are acupoints in the back and waist, perfused by meridian *qi* of the *zang-fu* organs, and can treat corresponding diseases of the *zang-fu* organs and improve insomnia by regulating *qi* mechanism of the *zang-fu* organs. The back-*shu* acupoints BL18, BL15, BL23 and BL20 were utilized to soothe the liver and regulate *qi*, restore interaction between the heart and the kidney, and fortify the spleen and harmonize the stomach [10,11]. In this study, EX-HN18 was utilized in the two groups. However, it achieved very good therapeutic effects as intradermal needle has the effects of “being static for a long retention”, and have more long-lasting stimulation to acupoints.

Considering the advantages of the intradermal needle, the intradermal needle is singly packaged and is clean and sterile. Compared with common needle, the intradermal needle is convenient to carry, use, and operate, and can be retained for a long time, with continuous stimulation. It does not influence normal life, and can be used for extended treatment, to realize quantity effects changed by time effects. The operating requirement for “Seirin Brand” intradermal needle is to imbed the needle for 24 h. However, according to the doctor’s clinical experiences, it may be prolonged to 48 h, under the conditions of standardized operations by doctors, and strict disinfection, and that the patient is advised to pay attention to cleanliness and sanitation at the needle-imbedded point. So for the patients in this study, the imbedded needle was retained for 2 days, to both maintain therapeutic effects and reduce treatment times, to bring convenience for patients. Additionally, the intradermal needle is of tiny needle body, sharp needle tip, and smooth needle trunk. The intradermal needle at auricular acupoint is to puncture superficially acupoints, with slight pain, and is easily accepted by patients. The limitation

of this study is there are differences between the courses of treatment. The total course of the intradermal needle group was 38 days and 20 days for the acupuncture group. The total treatment time in the intradermal needle group was longer than that in the acupuncture group, so there were some biases of this results, while the courses was settled according to the clinic experiences.

In summary, the intradermal needle has comparable therapeutic effects to those of conventional acupuncture, and has the advantages of extensive adaptability, simplicity and convenience, effectiveness, and long-lasting therapeutic effects, and individuation, etc. [12], and deserves clinical promotion. However, as the study had a limited sample size, and had possibly some bias, so it cannot demonstrate adequately that the therapy may replace acupuncture in a short period, although it deserves clinical promotion.

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