

Observation on Clinical Effects of Electroacupuncture for Migraine Without Aura

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Abstract

Objective: To observe the clinical effects of electroacupuncture (EA) for migraine without aura.

Methods: The migraine patients in conformity with the conditions were randomly divided into two groups, 34 cases in each group. The treatment group was given EA and the control group was given the routine acupuncture treatment, to observe various pain indexes respectively before and one month after the treatment.

Results: The general effect was remarkably better in the treatment group than that in the control group ($P < 0.05$).

Conclusion: EA is an effective therapy for migraine without aura.

Key Words

Acupuncture Therapy; Electroacupuncture; Migraine Disorders; Headache

Migraine without aura is a most common subtype of migraine and a frequently encountered disease clinically, manifested by repeated attacks of serious throbbing headache on one or both sides, generally lasting 4-72 h, and accompanied by nausea, vomiting and aggravated by sound or light stimulation or daily activities, severely affecting the life and work of the patients. In the whole world, 240 million of migraine patients suffer from 1.4 billion of migraine attacks every year^[1]. Those patients' quality of life decreased obviously. Migraine belongs to the scope of 'Head Wind' and 'Brain Wind' in traditional Chinese medicine. The pathological disorders in the meridians and Zang-fu organs will induce the occurrence of migraine. We have treated migraine without aura by electroacupuncture (EA). Now, the report is given as follows.

1 Clinical Materials

1.1 Diagnostic criteria

1.1.1 Diagnostic criteria in Western medicine

The diagnostic criteria in Western medicine were established upon the diagnostic criteria of migraine without aura (ordinary type) in the criteria of International Headache Society in 1988^[2]. At least 5 attacks; headache attacks lasting 4-72 h untreated or unsuccessfully treated; headache has the following characteristics: unilateral location, pulsating quality, moderate or severe pain intensity, and aggravation by or causing avoidance of routine physical activity (e.g. walking or climbing stairs); during headache at least nausea and/or vomiting and photophobia or phonophobia; the history and physical examination did not indicate the evidence of organic disease or the history and physical examination indicated the possibility of some organic

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diseases, but already excluded by the relevant laboratory examinations, or although some organic diseases existed, the primary attack of migraine was not attributed to the existing diseases.

1.1.2 Diagnostic criteria in traditional Chinese medicine

In reference to the *Criteria of Diagnosis and Therapeutic Effects of Diseases and Syndromes in Traditional Chinese Medicine* promulgated by the State Administration of Traditional Chinese Medicine^[3], the main symptoms are headache, with painful position mostly at the frontotemporal region, forehead or temple on one side, manifested by distending or throbbing pain. In accordance with the etiology and pathogenesis, there are five patterns.

Pattern of liver yang hyperactivity: Distending headache, vexation, frustration, red eyes, bitter taste in the mouth, accompanied by flushed complexion, dry mouth, a red tongue with yellow coating, wiry or wiry and rapid pulse.

Pattern of phlegm and turbidity: Headache with a sensation of being wrapped up in a towel, full and stuffy sensation in the chest and upper abdomen, nausea and salivation, accompanied by bland taste in the mouth, poor appetite, a flabby tongue with white and sticking coating, wiry and slippery pulse.

Pattern of kidney deficiency: Headache with empty sensation, dizziness, soreness in the low back and weakness in the knee, feverish sensation in the chest, palms and soles, accompanied by low spirit, lassitude, tinnitus, a red tongue with scanty coating, deep, thready and forceless pulse.

Pattern of blood stasis: Pricking headache, lingering in duration and fixed in position, a purple and dark tongue, or with stasis patches or spots, thin and white coating, deep and thready pulse or thready and choppy pulse.

Pattern of qi and blood deficiency: Insidious and repeated headache, aggravated by fatigue, accompanied by palpitations, poor appetite, spontaneous sweating, shortness of breath, low spirit and lassitude, pale complexion, a pale tongue with thin and white coating, deep, thready and weak pulse.

1.2 Inclusion criteria

Those in conformity with the above diagnostic criteria in Western medicine and Chinese medicine and agreed to accept and cooperate with acupuncture treatment.

1.3 Exclusion criteria

Those not in conformity with the above diagnostic criteria and inclusion criteria; those with headache caused by various cerebral organic diseases or other pathological conditions of the nervous system; those with headache induced by cervical spondylopathy, ear, nose and throat diseases; those with epilepsy and

mental disorders, and women in pregnancy or lactation; those complicated with severe cardiac, hepatic, renal and pulmonary dysfunction; and those not agree or not cooperate with the treatment.

1.4 General data

Sixty-eight cases with migraine were selected from January of 2008 to July of 2013, and were divided by a simple randomization method into a treatment group and a control group according to the visit order, 34 cases in each group. The differences of the general data between the two groups were not statistically significant by statistical management, indicating that the two groups were comparable (Table 1).

Table 1. Comparison of general data between the two groups

Groups	Gender (case)		Average age ($\bar{x} \pm s$, year)	Average duration ($\bar{x} \pm s$, month)
	Male	Female		
Treatment	10	24	46.79 \pm 12.59	26.64 \pm 10.79
Control	12	22	48.59 \pm 11.72	30.26 \pm 11.82

2 Therapeutic Methods

2.1 Treatment group

Major acupoints: Touwei (ST 8), Shuaigu (GB 8), Baihui (GV 20), Fengchi (GB 20), Taiyang (EX-HN 5), Hegu (LI 4), Sanyinjiao (SP 6).

Adjunct acupoints: Taichong (LR 3), Qixu (GB 40) and Ashi points were added for pattern of liver yang hyperactivity; Zhongwan (CV 12), Fenglong (ST 40) and Ashi points were added for pattern of phlegm and turbidity; Shenshu (BL 23) and Taixi (KI 3) were added for pattern of kidney deficiency; Geshu (BL 17) and Ashi points were added for pattern of blood stasis; and Xuehai (SP 10) and Zusanli (ST 36) were added for pattern of qi and blood deficiency^[4].

Operation: The supine position, or lateral recumbent position or sitting position was selected depending upon the position of the patient's headache. After routine disinfection of the local area by 75% alcohol cotton ball, the sterile acupuncture needles of 0.30 mm in diameter and 40 mm in length were used. After the arrival of the needling sensation, G6805-1 EA apparatus was connected to Touwei (ST 8) and Shuaigu (GB 8) as one group, and Baihui (GV 20) and Taiyang (EX-HN 5) as one group, with sparse-dense wave, and tolerable intensity. After 30 min, the needles were taken out.

2.2 Control group

Major acupoints: As same as that in the treatment group.

Adjunct acupoints: As same as that in the treatment group.

Operation: The supine position, or lateral recumbent position or sitting position was selected

depending upon the position of the patient's headache. After routine disinfection of the local area by 75% alcohol cotton ball, the sterile acupuncture needles of 0.30 mm in diameter and 40 mm in length were used. After arrival of the needling sensation, the reducing manipulation was applied for pattern of liver yang hyperactivity. The even reinforcing-reducing manipulation was applied for pattern of phlegm and turbidity and pattern of blood stasis. The reinforcing manipulation was applied for pattern of qi and blood deficiency and pattern of kidney deficiency. After retained for 30 min, the needles were taken out.

Both two groups were treated five times per week. Two weeks made one course. After two courses, the therapeutic effects were assessed.

3 Observation of Therapeutic Effects

3.1 Observed indexes^[2]

3.1.1 Numbers of headache attack

The number of headache attack within one month was summarized and scored.

- 0 point: No pain occurred.
- 2 points: Pain occurred for 1-2 times.
- 4 points: Pain occurred for 3-4 times.
- 6 points: Pain occurred for five times or above.

3.1.2 Pain degree

Visual analogue scale (VAS) was used to assess pain degree. A scale in 10 cm length was used, one end with '0' marked for no pain, and the other end with '10' marked for maximum pain. During the assessment, the patient was told to mark and score pain degree on the scale.

- 1 point: Length ≤ 2 cm.
- 2 points: Length > 2 cm, ≤ 4 cm.
- 3 points: Length > 4 cm, ≤ 6 cm.
- 4 points: Length > 6 cm, ≤ 8 cm.
- 5 points: Length > 8 cm, ≤ 10 cm.

3.1.3 Lasting period of headache

The longest lasting period of headache was scored. The headache lasting period was expressed by t.

- 1 point: $t \leq 2$ h.
- 2 points: $t > 2$ h, ≤ 6 h.
- 3 points: $t > 6$ h, ≤ 24 h.
- 4 points: $t > 24$ h, ≤ 72 h.
- 5 points: $t > 72$ h.

3.1.4 Headache indexes

Headache index refers to the sum of the product from scores of pain degree each time multiplied by the pain lasting period each time. For instance, a patient suffered from headache for three times within one month. In the first time, pain degree was scored 4 points and the pain lasting period was scored 2 points. In the second time, pain degree was scored 3 points and the pain lasting period was scored 2 points. In the

third time, pain degree was scored 2 points and the pain lasting period was scored 3 points. Then, headache index would be $4 \times 2 + 3 \times 2 + 2 \times 3 = 20$ (points).

3.2 Criteria of general therapeutic effects

The improvement of the clinical symptoms was calculated depending upon headache index one month after the treatment. The general therapeutic effects were assessed depending upon the improvement of the clinical symptoms.

The improvement of the clinical symptoms = (Headache index before treatment - Headache index after treatment) \div Headache index before treatment $\times 100\%$.

Recovery: The improvement of the clinical symptoms $\geq 90\%$.

Remarkable effect: The improvement of the clinical symptoms $\geq 60\%$, $< 90\%$.

Improvement: The improvement of the clinical symptoms $\geq 30\%$, $< 60\%$.

Failure: The improvement of the clinical symptoms $< 30\%$.

3.3 Statistical methods

The statistical analysis was performed by using SPSS 19.0 statistical software. All hypothesis tests were processed with bilateral tests. Paired *t*-test was used for intra-group comparison. The comparison between the groups was analyzed by independent sampling materials *t*-test. The Chi-square test was used for categorical varying data, and the rank sum test was used for ranked data.

3.4 Research results

3.4.1 Comparisons of observed indexes

Before treatment, the differences in the scores of various indexes between the two groups were not statistically significant, indicating that the two groups were comparable. After the treatment, the scores in various indexes in the two groups were obviously lower than those before treatment in the same group ($P < 0.05$), indicating that both therapeutic methods could relieve the headache symptom of the patients. After treatment, the differences in observed indexes between the two groups were statistically significant ($P < 0.05$), and the scores in observed indexes were lower in the treatment group than those in the control group, indicating that the patients' headache were relieved more in the treatment group (Table 2).

3.4.2 Comparison of the therapeutic effects

After treatment, the cases that had recovery or remarkable effect in the treatment group were obviously more than those in the control group. In comparison of the recovery and remarkable effective rate between the two groups, the difference was statistically significant ($P < 0.05$). In the rank sum test of the total effective rate of the two groups, the

difference was statistically significant ($P < 0.05$), indicating that the therapeutic effects were better in

the treatment group than in the control group (Table 3).

Table 2. Comparison of various indexes scores before and after treatment between the two groups ($\bar{x} \pm s$, point)

Items	Before treatment		4 weeks after treatment	
	Treatment group ($n=34$)	Control group ($n=34$)	Treatment group ($n=34$)	Control group ($n=34$)
Number of attack	4.05±1.43	4.23±1.07	2.23±1.18 ¹⁾²⁾	3.05±1.01 ¹⁾
Lasting period	2.73±0.99	2.94±0.95	1.44±1.05 ¹⁾²⁾	2.11±0.84 ¹⁾
Pain degree	3.44±0.85	3.29±0.90	1.91±0.79 ¹⁾²⁾	2.35±0.84 ¹⁾
Pain index	37.41±18.97	42.47±25.10	7.70±7.40 ¹⁾²⁾	16.29±11.63 ¹⁾

Note: Compared with the same group before treatment, 1) $P < 0.05$; compared with the control group after treatment, 2) $P < 0.05$

Table 3. Comparison of effects between the two groups (case)

Group	n	Recovery	Remarkable effect	Improvement	Failure	Recovery and remarkable effect rate (%)	Total effective rate (%)
Treatment	34	10	18	5	1	82.4 ¹⁾	97.1
Control	34	3	15	14	2	52.9	94.1

Note: Compared with the control group, 1) $P < 0.05$

4 Discussion

Migraine without aura is a commonly encountered and frequently occurring disease clinically. It belongs to the scope of 'head wind' and 'brain wind' in traditional Chinese medicine. Headache was first recorded in *Huang Di Nei Jing (Yellow Emperor's Classic of Internal Medicine)*, and the term of 'migraine' appeared in *Dan Xi Xin Fa (Zhu Dan-xi's Experiential Therapy)* for the first time.

In the twelve meridians, six yang meridians go upward to the head and face. The Governor Vessel, Yang Link Vessel and Yang Heel Vessel of the eight extraordinary meridians also go upward to the head. Therefore, the head is the 'convergence of all yang'. The Liver Meridian of Foot Jueyin goes upward to the vertex. Other yin meridians integrate with six yang meridians by the divergent meridians to reach the head. Headache can be induced by invasion of six exogenous pathogenic factors which stay in the meridians and inhibit the clear yang, or by internal injuries and various diseases, leading to abnormal flow of qi and blood in the meridians of the head, and accumulation of blood stasis in the meridians, and hence the obstruction of the meridians or malnutrition of the brain. Fengchi (GB 20) and Shuaigu (GB 8) were punctured to soothe the liver, regulate qi, and disperse pathogenic wind in Shaoyang Meridian. Baihui (GV 20) is an important acupoint for headache. Touwei (ST 8), Taiyang (EX-HN 5) and Hegu (LI 4) were punctured to dredge Yangming and Shaoyang Meridians. In addition to the treatment by pattern identification, the acupoints were also selected by pattern identification. For instance, Taichong (LR 3) and Qixu (GB 40) were

punctured to balance the liver and correct the reverse flow of qi. Zhongwan (CV 12) and Fenglong (ST 40) were punctured to strengthen the spleen and dissolve dampness. Shenshu (BL 23) and Taixi (KI 3) were punctured to nourish yin and reinforce the kidney. Geshu (BL 17) was punctured to activate blood and disperse blood stasis. Xuehai (SP 10) and Zusanli (ST 36) were punctured to reinforce and benefit qi and blood. In combination of the continuous stimulation of EA, all the acupoints had played a role in treating migraine without aura jointly.

The pathogenesis of migraine is still unknown. It is mostly believed in the theory of Western medicine that it is related to the activation of the trigeminal vascular system. The sensory fibers that dominate meningeal blood vessels, venous sinuses, dura mater and pia mater are small C fibers, dominated jointly by the first branch of the trigeminal nerve and the upper cervical nerve root. The attack of migraine starts from the central activation of the trigeminal nerve, causing the release of the vasoactive peptides, such as CGRP and P substance^[5], in the dominating area of the corresponding meninges of the trigeminal nerve, and causing vasodilation and neurogenic inflammatory reaction, and hence headache. Besides, it is believed in modern medicine that the attack of migraine is related to genetic factors, platelets and biochemical factors, dietary factors, and endocrine factors. The analgesic effect of acupuncture has been acknowledged publically by the international academic field^[6-10]. It has been indicated in the modern study that acupuncture can regulate the autonomic nerves that control blood vessels, and correct cerebral vascular dysfunction. EA can directly stimulate the nerves that transmit pain, and can enable this type of the nerves to produce blockage in

the conduction of the pain fibers on one hand and can enable the spinal dorsal horn cells to have the harmful stimulatory reaction inhibited on the other hand. At the same time, it has also been proven that EA can inhibit the activity of the reticular pain-sensitive neurons in the midbrain. EA can also promote the release of morphine-like substances in the brain and function on the opioid receptor to produce the analgesic effect^[11-13]. In the painstaking study on the neurochemical basis of acupuncture analgesia for over 40 years, Han Ji-sheng believes that the opioid substances of the brain can be released by puncturing corresponding acupoints to produce the analgesic effect. He also found that the electric pulses at different frequency could be applied to stimulate the brain and spinal cord to release different types of neuropeptides^[5], and the electric stimulation by 2/100 Hz in alternation could cause the release of three kinds of opioid peptides, so as to produce the analgesic effect in maximum.

It is indicated in the clinical study that EA can remarkably decrease the pain indexes of migraine without aura and the general therapeutic effect is better than the ordinary acupuncture group. EA for migraine without aura is an effective method worthy for clinical popularization, because it's free of side effects, the obvious therapeutic effect and good compliance from the patients.

Conflict of Interest

There is no potential conflict of interest in this article.

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Statement of Informed Consents

All of the patients signed the informed consent.

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