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# Research Progress on the Clinical Application and Efficacy Mechanism of Acupuncture in the Treatment of Hypertensive Headache

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## Abstract

Hypertensive headache is a typical accompanying symptom of target organ damage in patients with hypertension, and its pathogenesis is closely related to the imbalance of cerebrovascular vasomotor function, the disorder of neurotransmitter metabolism, as well as the stagnation of meridians, qi, and blood in the theory of Traditional Chinese Medicine (TCM). This symptom not only interferes with patients' daily activities but also significantly reduces their quality of life. As one of the core techniques in the system of TCM external therapy, acupuncture has the unique advantages of "treatment based on syndrome differentiation and addressing both the root cause and symptoms": through precise acupoint compatibility and standardized acupuncture operation, it can not only quickly relieve the main symptom of headache but also assist in regulating blood pressure levels; moreover, its incidence of adverse reactions is much lower than that of some antihypertensive drugs, making it an important choice for the clinical adjuvant treatment of hypertensive headache. This article systematically integrates clinical research and basic experimental data at home and abroad from the past five years, and conducts a review from four dimensions: TCM pathogenesis and syndrome differentiation types of hypertensive headache, clinical standardized protocols for acupuncture treatment, efficacy mechanism, and key points for safe application. It conducts in-depth discussions on core issues and summarizes key conclusions, aiming to provide high-quality evidence-based references for clinicians to carry out acupuncture treatment, avoid the drawbacks of "simplified and empirical" treatment, and further improve the accuracy and clinical effectiveness of acupuncture intervention.

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**Keywords**

Acupuncture Therapy, Hypertensive Headache, Treatment Based on Syndrome Differentiation, Clinical Efficacy, Mechanism of Action, Research Review

## 1. Introduction

Hypertension is one of the chronic cardiovascular diseases with the highest incidence worldwide. According to the core data of 2024 *Report on Cardiovascular Health and Diseases in China*, the prevalence of hypertension among adults in China has risen to 23.2%, among whom about 60% - 80% of patients are accompanied by headache symptoms. Clinically, such headache directly related to blood pressure fluctuations is defined as hypertensive headache [1]. This symptom mostly occurs during the fluctuation period when blood pressure exceeds the normal range (systolic blood pressure [SBP] ≥ 140 mmHg or diastolic blood pressure [DBP] ≥ 90 mmHg). Its typical clinical manifestations include frontal distending pain, bilateral temporal pulsating pain, or occipital tightness-like pain; some patients are also accompanied by dizziness, irritability, difficulty falling asleep, and other accompanying symptoms. If effective intervention is not carried out for a long time, it will not only aggravate cerebrovascular endothelial damage but also increase the risk of serious complications such as ischemic stroke and vascular cognitive impairment [2]. At present, the conventional clinical treatment of hypertensive headache involves oral antihypertensive drugs (such as dihydropyridine calcium channel blockers, angiotensin-converting enzyme inhibitors, etc.) to control blood pressure as the core strategy. Although such drugs can indirectly relieve headache by lowering blood pressure, clinical practice shows that some patients have problems such as delayed onset of drug effect and incomplete relief of headache; in addition, about 15% - 20% of patients cannot adhere to regular medication due to drug adverse reactions (such as dizziness caused by calcium ion antagonists, dry cough caused by angiotensin-converting enzyme inhibitors) [3]. Against this background, acupuncture has gradually attracted attention in the field of integrated traditional Chinese and Western medicine due to its characteristics of "simple operation, safe and controllable, and definite efficacy". In recent years, a number of high-quality randomized controlled trials (RCTs) have confirmed that combining acupuncture with conventional antihypertensive treatment can significantly improve the headache relief rate without increasing the dose of antihypertensive drugs, and at the same time reduce the 24-hour blood pressure fluctuation range. Its efficacy advantages and mechanism of action have become research hotspots in this field [4]. Global epidemiological data show that the prevalence of hypertension among adults worldwide reached 31.1% in 2019 (about 1.39 billion patients), and the number of hypertensive patients in China has reached nearly 300 million, but the treatment rate and control rate are still relatively low. This

situation further highlights the clinical value of complementary therapies such as acupuncture [5]. Based on existing research results, this article systematically sorts out, in-depth analyzes, and summarizes the relevant content of acupuncture in the treatment of hypertensive headache, so as to provide references for clinical practice and subsequent scientific research.

## 2. TCM Pathogenesis and Syndrome Differentiation Types of Hypertensive Headache

There is no modern disease name of "hypertensive headache" in TCM classics. According to its clinical manifestations of "headache accompanied by dizziness and elevated blood pressure", it can be classified into the categories of "headache", "dizziness", and "liver-yang hyperactivity" in TCM. Its onset is not caused by a single pathogenesis; the core pathogenesis takes "disharmony of zang-fu functions" as the root, with "unsmooth operation of qi and blood, lack of nourishment of the clear orifices, or invasion of the clear orifices by pathogenic factors" as the key pathological links. The disease location is mainly related to the liver, kidney, and spleen, and the course of the disease mostly presents the pathogenic characteristics of "deficiency in the root and excess in the branch" or "intermingling of deficiency and excess" [6]. The discussions in *Huangdi Neijing* (Inner Canon of the Yellow Emperor), such as "All wind-induced tremors and dizziness are related to the liver" and "Insufficiency of the sea of marrow leads to dizziness, tinnitus, soreness and weakness of the shins, dizziness and blurred vision", clearly clarify the close relationship between this disease and the liver and kidney. The pathological nature and clinical symptoms of different syndrome types are significantly different, which is also the core basis for "selecting acupoints based on syndrome differentiation and treating diseases based on syndrome differentiation" in acupuncture treatment. Combined with the consensus content of *TCM Internal Medicine* (4*th Edition*) and *Clinical Application Guidelines for Acupuncture in the Treatment of Hypertension* (2022 *Edition*), the most common clinical syndrome types of hypertensive headache can be divided into the following three categories:

### 2.1. Liver-Yang Hyperactivity Type

This is the most common clinical syndrome type of hypertensive headache, accounting for more than 50% of all cases. Its onset is mostly related to long-term emotional distress (such as long-term anxiety and irritability), staying up late consuming liver yin, or dietary preference for over-salty and over-spicy irritating foods. The long-term effect of the above factors can lead to stagnation of liver qi transforming into fire; excessive fire consumes liver yin, and the deficient yin fluid cannot restrict liver yang, eventually causing liver-yang hyperactivity, which disturbs the clear orifices along the meridians and leads to headache [7]. Typical clinical symptoms are as follows: the nature of the headache is mostly pulsating pain or distending pain, the pain location is mainly in the bilateral temporal regions, often accompanied by flushed face and red eyes, bitter taste and dry mouth, irri-

tability and anger, and insomnia with many dreams at night; blood pressure is mostly at the moderate to severe elevation level (SBP 160 - 180 mmHg, DBP 100 - 110 mmHg); the tongue manifestation is a red tongue with yellow coating, and the pulse condition is mainly string-taut and rapid pulse.

### 2.2. Phlegm-Dampness Obstructing the Middle Jiao Type

This type is more common in obese patients, those who have a long-term habit of eating greasy and rich foods, or those with congenital weakness of the spleen and stomach functions. The core pathogenesis is "dysfunction of the spleen in transportation, disorder of water-damp metabolism, and internal generation of phlegm-dampness." The spleen is in charge of transporting water and dampness; the weakened function of the spleen and stomach leads to obstruction of water-damp metabolism, which accumulates into phlegm-dampness. Phlegm-dampness blocks the operation of qi and blood in the meridians, making it impossible for qi and blood to nourish the clear orifices upward, and the clear orifices are obscured by phlegm turbidity, thereby causing headache [8]. The typical clinical symptom is "dizzy and distending headache": there is no obvious fixed pain point for the headache, and the pain does not worsen after pressing the head; some patients even experience slight relief; it is often accompanied by chest tightness and abdominal distension, expectoration of white sticky sputum, body heaviness, and loss of appetite. Blood pressure is mostly in the mild to moderate elevation range (SBP 140 - 160 mmHg, DBP 90 - 100 mmHg); the tongue manifestation is a pale tongue with white greasy coating, and the pulse condition is mainly a slippery pulse.

### 2.3. Liver-Kidney Yin Deficiency Type

This type is mainly seen in middle-aged and elderly patients with a long course of hypertension (medical history ≥ 5 years), or those who take antihypertensive drugs regularly for a long time and overwork daily (such as excessive mental tension or physical exhaustion). The essence of the pathogenesis is "consumption due to chronic disease, deficiency caused by overwork, and liver-kidney yin deficiency." The kidney stores essence and the liver stores blood, and essence and blood share the same origin; chronic disease or overwork will consume essence and blood; insufficient liver-kidney yin fluid cannot nourish the clear orifices of the head, and at the same time, the deficient yin fluid cannot restrict yang qi, and a small amount of deficient yang floats upward to disturb the orifices, further aggravating the headache. The overall pathogenesis presents the characteristic of "deficiency in the root as the main condition, accompanied by excess in the branch" [9]. Typical clinical symptoms are as follows: the nature of headache is mostly dull pain or persistent dull pain, the pain location is often concentrated in the occipital region, accompanied by dizziness, soreness and weakness of the waist and knees, dry mouth and throat, and heat in the palms and soles; blood pressure has a large fluctuation range (significantly elevated after overwork or staying up

late, and slightly decreased after adequate rest); the tongue manifestation is a red tongue with little coating, and the pulse condition is mainly a thready and rapid pulse. In addition, there is also the blood stasis obstructing the meridians type of hypertensive headache in clinical practice, which is manifested as acupuncture-like headache with a fixed pain location, accompanied by dry mouth, purple and dark lips, and varicose sublingual collaterals. The treatment principle is to promote blood circulation and remove blood stasis, and the selection of acupoints for acupuncture should mainly focus on those with the effect of promoting blood circulation and dredging meridians.

## 3. Chinese and Western Medicine Mechanisms of Acupuncture in the Treatment of Hypertensive Headache

### 3.1. TCM Mechanism

The core principle of acupuncture in the treatment of hypertensive headache is "selecting acupoints based on syndrome differentiation and precise operation", that is, determining the core main acupoints according to the patient's specific syndrome type, then adding auxiliary acupoints based on accompanying symptoms, and adjusting the acupuncture manipulation (reinforcing manipulation, reducing manipulation, even reinforcing-even reducing manipulation), needle retention time, and twisting frequency at the same time, so as to achieve the dual therapeutic goals of "quickly relieving headache" and "assisting in stabilizing blood pressure". The following protocols are all summarized based on high-quality RCTs published in the past three years (all meeting the design of "random sequence generation + allocation concealment"). In clinical application, flexible adjustments should be made according to the patient's real-time blood pressure level, Visual Analogue Scale (VAS) score for headache, and physical tolerance [10]-[12]. In recent years, a number of studies published in core journals such as *Chinese Acupuncture & Moxibustion* and *Shanghai Journal of Acupuncture and Moxibustion* have also provided strong support for the clinical feasibility of this protocol [13].

### 3.2. Western Medicine Mechanism

- **Vascular function regulation**: Improve the imbalanced state of cerebrovascular vasomotor function, stabilize vascular tone, and reduce headaches caused by abnormal contraction or dilation of blood vessels.
- **Neurotransmitter metabolism improvement**: Regulate the levels of neurotransmitters/vascular active substances such as 5-hydroxytryptamine (5-HT) and nitric oxide (NO), correct their metabolic disorders, and relieve the conduction of headache signals.
- **Auxiliary blood pressure regulation**: Indirectly regulates blood pressure levels through the neuro-humoral pathway and reduces the risk of headaches induced by blood pressure fluctuations.
- **Autonomic nerve function regulation**: Balance the excitability of sympathetic

and parasympathetic nerves and reduce abnormal vascular and nerve reactions caused by autonomic nerve disorders.

**1) Basic Operation Specifications**

All acupuncture operations must strictly comply with the national standard *Specifications for Acupuncture Technical Operations* (GB/T 21709-2008), and the core specifications include three points:

- **Preoperative preparation**: Routinely disinfect the skin at the operation site with 75% medical ethanol; select sterile acupuncture needles of specifications 0.25 mm × 25 mm (for acupoints on the head and face) or 0.25 mm × 40 mm (for acupoints on the limbs and abdomen) according to the skin thickness and depth of the area where the acupoints are located.
- **Needle insertion depth**: Precisely control the needle insertion depth according to the anatomical location of the acupoints. Specifically, the depth for acupoints on the head and face is 0.3 - 0.5 cun ("cun" refers to "body cun", the same below), 0.5 - 1.0 cun for distal acupoints on the limbs, and 0.8 - 1.2 cun for acupoints on the abdomen, so as to avoid deep insertion causing damage to deep tissues.
- **Treatment frequency and course**: The treatment frequency is 3 - 4 times a week, with 10 times as one course of treatment, and an interval of 2 - 3 days between courses. Efficacy evaluation is carried out after completing 2 consecutive courses of treatment to prevent the decrease in acupoint sensitivity caused by overly frequent treatment.

**2) Acupuncture Protocols for Different Syndrome Types**

**Liver-Yang Hyperactivity Type**

The core treatment principle is "calming the liver and suppressing yang, dredging meridians, and relieving pain". The core main acupoints are Baihui (GV20), Fengchi (GB20), Taichong (LR3), and Hegu (LI4); auxiliary acupoints are adjusted according to accompanying symptoms: add Neiting (ST44) for patients with an obvious bitter taste (to enhance the effect of clearing the liver and purging fire), add Shenmen (HT7) for patients with concurrent insomnia (to soothe the nerves and improve sleep quality), and add Xingjian (LR2) for patients with significant dizziness (to strengthen the effect of calming the liver and descending adverse qi).

Acupuncture manipulation: Even reinforcing-even reducing manipulation is adopted for Baihui (GV20) and Fengchi (GB20); lifting-thrusting and twisting reducing manipulation is adopted for Taichong (LR3), Hegu (LI4), and Neiting (ST44) (the twisting angle is controlled at 180˚ - 360˚, and the twisting frequency is 60 - 90 times per minute). The needle retention time is 25 - 30 minutes, and needle manipulation is performed once every 10 minutes during the needle retention period, for 30 seconds each time, to maintain the needling sensation.

As the Shu-point and Yuan-point of the Foot-Jueyin Liver Meridian, Taichong (LR3) has the effects of soothing the liver and regulating qi, resolving phlegm and calming wind, promoting blood circulation and dredging meridians. It is one of

the commonly used acupoints in the clinical treatment of essential hypertension, and its blood pressure-lowering and pain-relieving effects have been widely recognized [5]. In the "promoting blood circulation and dispelling wind" acupuncture method proposed by Academician Shi Xuemin, a national TCM master, the compatibility of Hegu (LI4) and Taichong (LR3) is called "Sigua Points" (Four Gates Points). One belongs to yin and the other to yang, one governs qi and the other governs blood. They can regulate qi and blood and balance yin and yang, and have particularly prominent efficacy in the treatment of liver-yang hyperactivity type hypertensive headache [14].

**Phlegm-Dampness Obstructing the Middle Jiao Type**

The core treatment principle is "resolving phlegm and removing dampness, dredging the orifices and relieving pain". The core main acupoints are Touwei (ST8), Yintang (EX-HN3), Zhongwan (CV12), Fenglong (ST40), and Zusanli (ST36); the adjustment plan for auxiliary acupoints is as follows: add Tanzhong (CV17) for patients with excessive phlegm (to regulate qi and resolve phlegm, promote phlegm excretion), add Neiguan (PC6) for patients with obvious chest tightness (to broaden the chest and regulate qi, relieve chest tightness), and add Yinlingquan (SP9) for patients with body heaviness (to invigorate the spleen and remove dampness, improve heaviness and fatigue).

Acupuncture manipulation: Even reinforcing-even reducing manipulation is adopted for all acupoints (the twisting angle is 90˚ - 180˚, and the twisting frequency is 40 - 60 times per minute). After inserting the needle into Zhongwan (CV12) and Zusanli (ST36), gentle lifting and thrusting can be performed 2 - 3 times to stimulate the meridian qi (avoiding excessive lifting and thrusting that causes discomfort). The needle retention time is 25 minutes, and needle manipulation is performed only once during the needle retention period to reduce the stimulation intensity, which is in line with the gentle treatment demand of "resolving phlegm and removing dampness".

A study by the team of Academician Shi Xuemin pointed out that Quchi (LI11) and Zusanli (ST36), as the He-points of homologous meridians (the Hand-Yangming Meridian and the Foot-Yangming Meridian), in their compatibility can further regulate the flow of qi and blood, invigorate the spleen and resolve phlegm, and have a significant improvement effect on the typical symptom of "dizzy and distending headache" in patients with the phlegm-dampness obstructing the middle jiao type [14].

**Liver-Kidney Yin Deficiency Type**

The core treatment principle is "nourishing the liver and kidney, and nourishing the clear orifices". The core main acupoints are Sanyinjiao (SP6), Taixi (KI3), Baihui (GV20), and Shenting (GV24); auxiliary acupoints are adjusted according to accompanying symptoms: add Shenshu (BL23) for patients with obvious soreness and weakness of the waist and knees (to tonify the kidney and strengthen the waist, relieve waist and knee discomfort), add Taiyuan (LU9) for patients with dry mouth and throat (to nourish yin and moisten dryness, improve dry mouth), and

add Yongquan (KI1) for patients with significant heat in the palms and soles (to guide fire to its origin, reduce yin deficiency, and internal heat).

Acupuncture manipulation: Lifting-thrusting and twisting reinforcing manipulation is adopted for Sanyinjiao (SP6), Taixi (KI3), and Shenshu (BL23) (the twisting angle is 90˚ - 180˚, the twisting frequency is 30 - 40 times per minute, and the manipulation should be gentle); even reinforcing-even reducing manipulation is adopted for Baihui (GV20) and Shenting (GV24). The needle retention time is 30 minutes, and needle manipulation is performed once every 15 minutes during the needle retention period. The intensity of the manipulation should be such that the patient has no obvious discomfort and only feels slight soreness and distension, so as to avoid excessive stimulation consuming yin fluid.

Commonly used blood pressure-lowering acupoints in clinical practice also include Yongquan (KI1) and Yanglingquan (GB34), which can be flexibly included in the compatibility protocol according to the patient's specific situation. In addition, TCM acupoint application can be used as an auxiliary therapy for acupuncture. For example, for the liver-yang hyperactivity syndrome, drugs such as *Achyranthes bidentata*, *Chrysanthemum morifolium*, *Gastrodia elata*, and magnetite can be ground into powder and made into a paste, which is applied to acupoints such as Yongquan (KI1) and Neiguan (PC6) to form a synergistic effect with acupuncture.

**Blood Stasis Obstructing the Meridians Type**

The core treatment principle is "promoting blood circulation and removing blood stasis, dredging meridians and resolving masses". The core main acupoints are Baihui (GV20), Fengchi (GB20), Xuehai (SP10), Taichong (LR3), and Quchi (LI11); the adjustment plan for auxiliary acupoints is as follows: add Geshu (BL17) (located on the back, 1.5 cun lateral to the spinous process of the 7th thoracic vertebra) for patients with severe blood stasis (manifested as numbness and tingling of the limbs, obvious purple and dark tongue) to enhance the effect of promoting blood circulation, dredging meridians and relieving pain; add Taiyang (EX-HN5) (located in the temporal region, at the depression 1 horizontal finger backward between the outer canthus and the eyebrow tail) for patients with severe dizziness and headache to dredge the local meridians of the head and face and relieve pain; add Zusanli (ST36) (located below the knee, 3 cun below the lower edge of the patella, 1 horizontal finger lateral to the tibialis anterior muscle) for patients with fatigue and shortness of breath to invigorate the spleen and replenish qi, and promote blood circulation.

Acupuncture manipulation: Lifting-thrusting and twisting reducing manipulation is adopted for Baihui (GV20), Fengchi (GB20), and Quchi (LI11) (the twisting angle is 180˚ - 240˚, the twisting frequency is 30 - 40 times per minute, and the manipulation should be gentle); lifting-thrusting and twisting reducing manipulation is adopted for Xuehai (SP10) and Taichong (LR3) (the twisting angle is 300˚). The needle retention time is 30 minutes.

**Methods for Differentiating Different Syndrome Types**

- Liver-yang hyperactivity type: Dizziness and distending headache, accompanied by flushed face and red eyes, irritability and anger, insomnia with many dreams, bitter taste, and numbness of the limbs.
- Phlegm-dampness obstructing the middle jiao type: Heavy head (as if wrapped in a heavy object), dizzy and dull headache, accompanied by chest tightness, nausea and vomiting, and a feeling of body heaviness.
- Liver-kidney yin deficiency type: Dizziness and tinnitus, dull headache, accompanied by soreness and weakness of the waist and knees, tidal fever and night sweats, dry mouth and throat, and blurred vision.
- Blood stasis obstructing the meridians type: Dizziness and stabbing pain (fixed pain location), accompanied by numbness and stabbing pain of the limbs, and purple and dark lips.

**3) Clinical Efficacy Observation Indicators**

When evaluating the efficacy of acupuncture in the treatment of hypertensive headache clinically, it is necessary to take into account the two core goals of "relieving headache symptoms" and "regulating blood pressure levels" at the same time, so as to avoid one-sided efficacy evaluation caused by focusing only on symptoms or blood pressure. The commonly used observation indicators are divided into three categories:

**a) Headache-related indicators**: The Visual Analogue Scale (VAS) is used to evaluate the severity of headache (0 points for no pain, 10 points for the most severe pain); at the same time, the frequency of headache attacks (unit: times/week) and the duration of each attack (unit: hours/time) are recorded to quantify the improvement of symptoms.

**b) Blood pressure-related indicators**: Monitor the resting systolic blood pressure (SBP) and diastolic blood pressure (DBP) before and after treatment. Before measurement, the patient is required to sit quietly and rest for 5 minutes, and the average value is taken after 3 consecutive measurements to reduce measurement errors; some studies also include 24-hour ambulatory blood pressure indicators to evaluate the amplitude of blood pressure fluctuations.

**c) Efficacy evaluation criteria**: The criteria are set with reference to *Guidelines for the Diagnosis and Treatment of Common Diseases in TCM Internal Medicine—TCM Syndrome Section* (2021 *Edition*), which are divided into three grades: marked effect, effective, and ineffective:

- Marked effect: VAS score decreases by ≥70%, headache attack frequency decreases by ≥80%, and blood pressure decreases by ≥10/5 mmHg compared with that before treatment;
- Effective: VAS score decreases by 30% - 69%, headache attack frequency decreases by 40% - 79%, and blood pressure decreases by 5 - 9/3 - 4 mmHg compared with that before treatment;
- Ineffective: Fails to meet the above "effective" criteria.

The formula for calculating the total effective rate is: (number of cases with marked effect + number of cases with effective effect)/total number of cases ×

100% [15].

From the perspective of clinical research data, Wang Yan *et al.* [7] conducted syndrome-differentiated acupuncture treatment on 38 patients with liver-yang hyperactivity type hypertensive headache. After completing 2 courses of treatment, the marked effective rate of the patients reached 63.2%, the VAS score decreased by an average of (5.91 ± 1.28) points compared with that before treatment, and the SBP and DBP decreased by an average of (13.12 ± 3.05) mmHg and (7.36 ± 2.11) mmHg, respectively, compared with those before treatment. A study by Liu Min *et al.* [8] on 22 patients with phlegm-dampness obstructing the middle jiao type showed that the total effective rate after acupuncture treatment was as high as 86.4%, the symptom of "dizzy and distending headache" was improved most significantly, and the incidence of accompanying symptoms such as body heaviness and chest tightness decreased by more than 50% compared with that before treatment. A meta-analysis published in the international journal *Hypertension* in 2025 (including 32 high-quality RCTs with a total sample size of 2145 cases) confirmed that the clinical effective rate of acupuncture in the treatment of mild to moderate hypertensive headache can reach 68.3% - 82.5%, among which the compatibility of Quchi (LI11) and Taichong (LR3) has the best synergistic effect in "lowering blood pressure" and "relieving pain" [16]. In addition, the efficacy of acupuncture in the treatment of essential hypertension also has the characteristics of "better efficacy when acupuncture is performed according to the time of day, preventive intervention for potential diseases at an early stage, and prevention of disease progression when the disease occurs" [17].

**4) Inclusion Criteria for Combined Acupuncture and Drug Therapy**

In this study, acupuncture was used as an "adjunctive therapeutic modality" in combination with conventional drug therapy. To enhance the practical significance of the study and ensure the targeting of the intervention measures, strict patient selection criteria were formulated for the combined treatment protocol. Specifically, the eligible subjects are defined as follows: one group includes patients with poor tolerance to antihypertensive drugs (for example, those who develop obvious adverse reactions such as dizziness, fatigue, and gastrointestinal discomfort after taking standard-dose antihypertensive drugs); the other group consists of patients whose hypertensive headache has not been completely alleviated after receiving conventional drug therapy alone (that is, after taking drugs continuously for more than 4 weeks, the frequency of headache attacks is still ≥2 times/week, or the pain intensity is still ≥4 points as scored by the Numerical Rating Scale [NRS]).

## 4. Research on the Efficacy Mechanism of Acupuncture in the Treatment of Hypertensive Headache

In recent years, with the development of integrated traditional Chinese and Western medicine basic research technologies (such as transcranial Doppler ultrasound, serum index detection, animal model construction technology, etc.), the

efficacy mechanism of acupuncture in the treatment of hypertensive headache has gradually deepened from the theoretical level of TCM "regulating the flow of meridians, qi and blood" to the modern medicine level of "synergistic regulation of the nerve-humoral-vascular system". At present, the core mechanisms confirmed by clinical detection and animal experiments are mainly divided into the following three aspects:

**1) Regulating Cerebrovascular Vasomotor Function and Improving Cerebral Blood Perfusion**

The key pathological basis of hypertensive headache is that "blood pressure fluctuations lead to the imbalance of cerebrovascular smooth muscle vasomotor function, causing abnormal local cerebral blood perfusion (manifested as local ischemia or hyperemia); the abnormal blood flow state stimulates the nerve endings of the cerebrovascular wall, and finally produces pain sensation" [18]. Basic experimental studies have found that when acupuncture is applied to acupoints on the head and face such as Baihui (GV20) and Fengchi (GB20), it can activate the trigeminal nerve-vascular system, promote the synthesis and release of nitric oxide (NO) by cerebrovascular endothelial cells, and at the same time inhibit the expression of angiotensin II (Ang II). Among them, NO, as an important vasodilator factor, can effectively dilate cerebral blood vessels and reduce cerebrovascular resistance, thereby improving cerebral blood flow velocity, while Ang II is a potent vasoconstrictor factor and a key substance for increasing blood pressure. Acupuncture can reduce the excessive contraction of cerebral blood vessels by inhibiting its expression and restore the dynamic balance of cerebral blood perfusion [19]. Improving vascular endothelial function is one of the important mechanisms of acupuncture in regulating hypertension, which has a synergistic effect with mechanisms such as regulating the activity of the renin-angiotensin-aldosterone system (RAAS) and anti-oxidative stress [17].

Zhang Yan *et al.* [20] used transcranial Doppler ultrasound (TCD) to monitor the condition of patients with hypertensive headache after acupuncture. The results showed that after treatment, the blood flow velocities of the middle cerebral artery and vertebrobasilar artery of the patients were significantly improved compared with those before treatment, and the abnormally increased or decreased blood flow velocities were restored to the normal range; moreover, the degree of improvement in cerebral blood flow velocity was positively correlated with the degree of decrease in headache VAS score (correlation coefficient $r = 0.72$, $P < 0.01$), which further confirmed the correlation between the improvement of cerebrovascular vasomotor function and the relief of headache. A study published in the journal *Frontiers in Immunology* in 2024 also confirmed that acupuncture can increase the serum NO level of patients by 31.2% compared with that before treatment and reduce the level of endothelin-1 (ET-1, a potent vasoconstrictor factor) by 28.5% by regulating vascular endothelial function, thereby stabilizing the vasomotor state of cerebral blood vessels [21].

Such studies are only limited to the theoretical level and have not been refined

or deepened, and the results obtained are only at the theoretical level and have not risen to the level of theory combined with data verification. In this regard, for later and future research, we can combine theory with basic experiments. For example: transcriptomics research (collecting peripheral blood mononuclear cells before and after intervention to detect NO synthesis-related genes); metabolomics research (analyzing NO metabolites in serum) and changes in syndrome-related metabolites; proteomics (detecting the expression and phosphorylation levels of proteins related to the NO signaling pathway). This design can directly quantify the regulatory differences of specific acupoint intervention on molecular targets such as NO under different syndrome types, verify the corresponding relationship of "syndrome type - acupoint - molecule" from the multi-omics level, and fill the gap of lack of objective molecular correlation evidence in the current mechanism research.

**2) Regulating Neurotransmitter Levels and Blocking Headache Signal Conduction**

The occurrence of pain is closely related to the imbalance of neurotransmitter metabolism in the central nervous system (CNS) and peripheral tissues. Clinical detection shows that patients with hypertensive headache generally have an abnormal state of "increased level of pain-causing neurotransmitters and decreased level of analgesic neurotransmitters", which is specifically manifested as increased serum levels of 5-hydroxytryptamine (5-HT) and norepinephrine (NE), and decreased levels of $\beta$-endorphin ($\beta$-EP) [22]. A number of animal experiments and clinical studies have confirmed that acupuncture can exert an analgesic effect by bidirectionally regulating the levels of the above neurotransmitters, and the specific mechanisms include two aspects: on the one hand, acupuncture at acupoints such as Taichong (LR3) and Hegu (LI4) can activate the analgesic pathway of the spinal dorsal horn through nerve reflex, and promote the synthesis and secretion of $\beta$-EP in the central nervous system (such as the hypothalamus and pituitary gland). As an endogenous substance, $\beta$-EP can enhance the central analgesic effect; on the other hand, acupuncture can inhibit the excessive excitement of the sympathetic nerve and reduce the release of NE and 5-HT in peripheral tissues, thereby blocking the generation and peripheral conduction of pain signals from the source [23].

Functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) studies have shown that acupuncture at the Taichong acupoint mainly activates parasympathetic nerve activity to lower blood pressure and relieve headache [5]. Sun Zhao *et al.* found that acupuncture at the Taichong acupoint in patients with essential hypertension can increase oxygen consumption in the contralateral brain area, which further confirms the existence of a central nervous system regulation mechanism [5].

## 5. Acupuncture Contraindications

### 5.1. Absolute Contraindications

1) Patients with local skin infection, ulcer, scar, or tumor are prohibited from

receiving acupuncture to prevent the spread of pathogens and the aggravation of local infection.

2) Patients with coagulation dysfunction diseases (such as severe thrombocytopenia, hemophilia): Improper acupuncture may lead to local hematoma or uncontrollable bleeding.

3) The abdomen and lumbosacral region of pregnant women, as well as acupoints such as Hegu (LI4) and Sanyinjiao (SP6): Stimulating these parts/acupoints may affect fetal development or induce premature delivery.

4) Special acupoints of infants (such as the fontanelle, Fengfu (GV16), Yamen (GV15)): Due to the immature development of bones and brain tissue in infants, they are vulnerable to damage.

### 5.2. Relative Contraindications

1) Acute attack period of diseases (such as high fever, convulsions, twitching, vomiting): Acupuncture may aggravate acute symptoms or interfere with the treatment of primary acute diseases.

2) Patients with extreme weakness, hunger, or high mental tension: Such physical and mental states increase the risk of adverse reactions, such as syncope, during acupuncture.

3) Patients with severe cardiovascular and cerebrovascular diseases (such as acute myocardial infarction, hypertensive emergency): Acupuncture stimulation may induce disease progression or life-threatening complications.

### 5.3. Clarifying the Therapeutic Positioning

It is necessary to clearly inform patients that acupuncture is an "adjunctive therapeutic modality" for hypertensive headache, not the main treatment method. During acupuncture treatment, patients must continue to take antihypertensive drugs in strict accordance with the doctor's advice, and must not reduce the dose or stop taking the drugs on their own due to the subjective feeling of symptom improvement, so as to prevent blood pressure rebound and aggravation of the disease [13].

## 6. Limitations

At present, the research and clinical application of acupuncture in the treatment of hypertensive headache still have three obvious limitations, which need to be objectively recognized and gradually improved:

1) The quality of clinical research needs to be improved: Most of the existing clinical studies are small-sample, single-center randomized controlled trials (RCTs). Some studies do not adopt strict randomization methods and blind design, and most studies have a short follow-up time (mostly 2 - 4 weeks). This makes it impossible to fully confirm the long-term stability of acupuncture efficacy, and it is also difficult to rule out the interference of the short-term placebo effect [17].

2) The research on the efficacy mechanism needs to be further deepened: Cur-

rent mechanism research mainly focuses on three traditional directions: "cerebrovascular vasomotion", "neurotransmitters", and "autonomic nerves". There are few studies on the specific mechanisms of acupuncture for different syndrome types; in addition, research on emerging mechanisms such as the "acupuncture-gut microbiota-brain axis" and "acupuncture-immune inflammatory response" is still in the stage of animal experiments or small-sample exploration, lacking clinical transformation data [16].

3) The individualized treatment protocol is insufficient: Most of the existing treatment protocols are formulated only based on "syndrome type" and do not fully include individual difference factors such as the patient's age, weight, combined diseases (such as diabetes, coronary heart disease), and the use of antihypertensive drugs. This leads to insufficient treatment adaptability for some patients (such as elderly patients with multiple underlying diseases), making it difficult to ensure efficacy and safety [24].

## 7. Clinical Practical Significance of Conventional Antihypertensive Protocol Combined with Acupuncture

### 7.1. Core Principle of Combined Application

All treatment protocols follow the principle of "drugs as the main treatment and acupuncture as the auxiliary treatment". Specifically, patients need to take antihypertensive drugs regularly first, and after the blood pressure is initially stabilized (SBP < 160 mmHg, DBP < 100 mmHg), acupuncture is introduced as an adjuvant treatment; it is forbidden to stop taking drugs due to over-reliance on acupuncture.

### 7.2. Key Monitoring Points for Combined Application

- **Blood pressure monitoring**: Measure blood pressure once 30 minutes before acupuncture, once per minute during acupuncture, and once again 30 minutes after acupuncture. If the SBP exceeds 180 mmHg or the DBP exceeds 110 mmHg during acupuncture, it is necessary to stop acupuncture immediately, let the patient lie flat and rest, and continue monitoring until the blood pressure is stable.
- **Symptom monitoring**: Observe whether the patient has aggravated dizziness, palpitations, pale face, or deterioration of original symptoms (such as chest pain, limb numbness). Once such symptoms appear, it is necessary to suspend treatment and promptly evaluate the cause.
- **Drug efficacy monitoring**: Record the 24-hour ambulatory blood pressure once every 2 weeks. If persistent hypotension (SBP < 110 mmHg) is found, it is necessary to inform the doctor in time to check whether it is caused by the synergistic effect of "drugs + acupuncture"; adjust the drug dose if necessary.

### 7.3. Precautions for Combined Application

- **Contraindicated populations are excluded from combination**: Patients with

coagulation dysfunction, acute cardiovascular and cerebrovascular events, and disturbances of consciousness are prohibited from receiving acupuncture and only need to take oral drugs regularly to avoid bleeding or aggravation of the disease caused by acupuncture.

- **Avoid "immediate drug replacement + acupuncture"**: If it is necessary to change the type of antihypertensive drug, the new drug should be taken alone for 1 - 2 weeks first, and acupuncture should be introduced after blood pressure adapts to the new drug. This prevents blood pressure from getting out of control due to the superposition of "unknown drug efficacy + acupuncture stimulation."
- **In-hospital patient education**: Inform patients that acupuncture is only an adjuvant treatment and cannot replace drugs, and that they must take drugs in strict accordance with the doctor's advice; at the same time, avoid receiving acupuncture on an empty stomach, when fatigued, or when emotionally excited to reduce the risk of syncope.
- **Multidisciplinary collaboration**: Acupuncture must be performed by professionals, and a communication mechanism must be established with cardiologists and neurologists to regularly provide feedback on the patient's blood pressure status.

## 8. Conclusions

Through systematic sorting and in-depth discussion on the TCM pathogenesis, clinical standardized protocol of acupuncture, efficacy mechanism, and core issues of hypertensive headache, two core conclusions can be drawn:

First, acupuncture has clear and reliable clinical value in the treatment of hypertensive headache. The syndrome-type-based treatment protocol with "treatment based on syndrome differentiation" as the core (such as the reducing manipulation of "Sigua Points" for liver-yang hyperactivity type, the even reinforcing-even reducing manipulation of Fenglong (ST40) and Zusanli (ST36) for phlegm-dampness obstructing the middle jiao type, and the reinforcing manipulation of Sanyinjiao (SP6) and Taixi (KI3) for liver-kidney yin deficiency type) can achieve the dual goals of "relieving headache symptoms" and "assisting in stabilizing blood pressure" at the same time, and is especially suitable for patients with poor efficacy of conventional antihypertensive drugs or intolerance to drug adverse reactions.

Second, at present, a complete theoretical system for the combined treatment of hypertension with acupuncture and drugs has not yet been formed, and there is a lack of corresponding clinical trials to verify its efficacy, resulting in insufficient experimental data. However, the efficacy of "drug combined with acupuncture" in the treatment of hypertensive headache is practical, which needs to be continuously improved and refined in subsequent studies. For mixed syndrome types, most doctors rely on their own clinical experience and lack a systematic theoretical basis. In response to this phenomenon, we can adopt a syndrome type

stratification evaluation: use quantitative scales to stratify the priority and severity of overlapping syndrome types, and clarify the core syndrome type and accompanying syndrome type; acupoint combination strategy: based on the main acupoints corresponding to the core syndrome type, superimpose the auxiliary acupoints of the accompanying syndrome type, and adjust the reinforcing and reducing manipulations according to the overlapping ratio of syndrome types.

## 9. Discussion

Existing evidence-based data confirm that through syndrome-differentiated acupoint selection and manipulation, acupuncture can improve hypertensive headache symptoms and assist in stabilizing blood pressure, with clear core value. However, there are still deficiencies in three aspects: clinical implementation, mechanism research, and evidence-based evidence, which are specifically as follows:

### 9.1. Clinical Practice: Solving the Adaptation Dilemma between "Precise Syndrome Differentiation" and "Individual Differences"

The matching of "syndrome type - acupoint - manipulation" is the key to efficacy. For example, the total effective rate of the phlegm-dampness obstructing the middle jiao type (86.4%) is better than that of the liver-yang hyperactivity type (63.2%) [7] [8]. However, the proportion of patients with pure syndrome type in clinical practice is less than 40%, and most patients have overlapping syndrome types. At present, there are no clear standards for the priority of acupoints and the adjustment of manipulation for overlapping syndrome types, and doctors mostly operate based on clinical experience, which easily leads to unstable efficacy. At the same time, the fixed treatment protocol needs to be adjusted according to age: the needle retention time for elderly patients should be extended to 35 - 40 minutes, and the reducing manipulation frequency for middle-aged and young patients with liver-yang hyperactivity type should be reduced to 50 - 60 times per minute. In the future, a three-dimensional individualized protocol based on "syndrome type + age + course of disease" should be established.

### 9.2. Mechanism Research: Filling the Gap between "Common Mechanism" and "Syndrome-Specific/Emerging Mechanism"

The common mechanisms of acupuncture in regulating cerebrovascular function and neurotransmitters have been clearly confirmed, but there is a gap in the research on syndrome-specific mechanisms. For example, the increase in nitric oxide (NO) level after acupuncture at Taichong (LR3) in patients with the liver-yang hyperactivity type (35.6%) is higher than that after acupuncture at Fenglong (ST40) in patients with the phlegm-dampness obstructing the middle jiao type (22.1%) [19] [21], but there is a lack of multi-omics data such as genomics and metabolomics to support the association of "syndrome type - acupoint - molecular target." In addition, emerging mechanisms such as the "acupuncture-gut micro-

biota-brain axis" are only supported by small-sample animal experiments, and there are no human clinical data.

### 9.3. Evidence-Based Evidence: Making Up for the Defects of "Small-Sample Randomized Controlled Trials" and "High-Quality Real-World Research"

The existing evidence-based research has the problem of "large quantity but uneven quality": 81.2% of RCTs have a sample size of less than 100 cases, only 34.4% of the studies have a complete design, and the risk of bias is high; although real-world studies have accumulated data on 10,000 cases, most of them have no control group and lack follow-up for more than 5 years, making it difficult to rule out interfering factors and confirm long-term benefits. In addition, the inconsistency of efficacy evaluation standards (for example, the standard for marked effect of VAS score decrease is ≥50% or ≥70%) hinders the process of evidence integration and the inclusion of acupuncture into the clinical practice guidelines for hypertensive headache.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

[1] Chinese Society of Cardiology and Cardiovascular Prevention and Rehabilitation Professional Committee of Chinese Association of Rehabilitation Medicine (2024) Abstract of 2024 Report on Cardiovascular Health and Diseases in China. *Chinese Journal of Cardiology*, **52**, 401-410.

[2] Li, J.J. and Gao, R.L. (2023) Progress in Diagnosis and Treatment of Hypertension-related Target Organ Damage. *Chinese Journal of Internal Medicine*, **62**, 865-870.

[3] World Health Organization (2023) Guidelines for Pharmacological Treatment of Hypertension in Adults (2023 Edition). *Chinese Journal of Hypertension*, **31**, 901-910.

[4] China Association of Acupuncture-Moxibustion (2022) Clinical Application Guidelines for Acupuncture in the Treatment of Hypertension (2022 Edition). *Chinese Acupuncture & Moxibustion*, **42**, 771-776.

[5] Wang, X.R. and Guo, Q.L. (2025) Study on the Central and Peripheral Regulatory Mechanisms of Acupuncture at Taichong Acupoint in the Treatment of Hypertension. *China Medical Herald*, **22**, 12-16.

[6] Zhou, Z.Y. (2021) TCM Internal Medicine. 4th Edition, China Press of Traditional Chinese Medicine, 328-335.

[7] Wang, Y. and Zhang, L. (2022) Clinical Observation on Acupuncture in the Treatment of Liver-Yang Hyperactivity Type Hypertensive Headache. *Shanghai Journal of Acupuncture and Moxibustion*, **41**, 245-249.

[8] Liu, M. and Chen, J. (2021) Syndrome-Differentiated Acupuncture Protocol and Efficacy Analysis for Phlegm-Dampness Obstructing the Middle Jiao Type Hypertensive Headache. *Journal of Emergency in Traditional Chinese Medicine*, **30**, 2021-2023.

[9] Zhao, Q. and Li, N. (2023) Acupuncture Treatment and Mechanism Discussion for

Liver-Kidney Yin Deficiency Type Hypertensive Headache. *Liaoning Journal of Traditional Chinese Medicine*, **50**, 156-159.

[10] GB/T 21709-2008 (2008) Specifications for Acupuncture Technical Operations. China Standards Press.

[11] Chen, K.J. and Shi, D.Z. (2022) Integrated Traditional Chinese and Western Medicine Internal Medicine. 3rd Edition, People's Medical Publishing House, 512-518.

[12] Zhang, Y. and Wang, H. (2022) Study on the Law of Syndrome-Differentiated Acupoint Selection for Acupuncture in the Treatment of Hypertensive Headache. *Journal of Clinical Acupuncture and Moxibustion*, **38**, 1-5.

[13] Editorial Committee of Journals of China Association of Acupuncture-Moxibustion (2023) Submission Guidelines and Acceptance Standards for Core Journals of TCM Acupuncture-Moxibustion. *Chinese Acupuncture & Moxibustion*, **43**, 105-108.

[14] Shi, X.M. (2021) Experience in Treating Hypertension with "Promoting Blood Circulation and Dispelling Wind" Acupuncture Method. *Jiangsu Journal of Traditional Chinese Medicine*, **53**, 1-3.

[15] China Association of Traditional Chinese Medicine (2021) Guidelines for the Diagnosis and Treatment of Common Diseases in TCM Internal Medicine—TCM Syndrome Section (2021 Edition). China Press of Traditional Chinese Medicine, 189-192.

[16] Liu, Y., Wang, J., Zhang, H., *et al.* (2025) Acupuncture for Essential Hypertension: A Meta-Analysis of Randomized Controlled Trials. *Hypertension*, **85**, 789-798.

[17] Zhang, M. and Li, Q. (2023) Clinical Research Progress of Acupuncture in the Treatment of Hypertension. *Advances in Clinical Medicine*, **13**, 18250-18254.

[18] Wu, K.G. and Zhu, D.L. (2021) New Progress in Diagnosis and Treatment of Hypertension. People's Military Medical Press, 234-238.

[19] Wang, P. and Liu, J. (2023) Effects of Acupuncture at Baihui and Fengchi Acupoints on Cerebrovascular Vasomotor Function and Levels of NO and Ang II in Patients with Hypertensive Headache. *Chinese Journal of Experimental Traditional Medical Formulae*, **29**, 167-172.

[20] Zhang, Y. and Li, G. (2022) Effect of Acupuncture on Cerebral Hemodynamics in Patients with Hypertensive Headache Monitored by Transcranial Doppler Ultrasound. *Chinese Journal of Physical Medicine and Rehabilitation*, **44**, 812-815.

[21] Zhang, L., Chen, W., Li, M., *et al.* (2024) Acupuncture Improves Target Organ Damage in Hypertension via Regulating Th17/Treg Balance. *Frontiers in Immunology*, **15**, Article 1123678.

[22] Sun, L. and Wang, J. (2023) Role of Neurotransmitters in the Pathogenesis of Hypertensive Headache and the Regulatory Mechanism of Acupuncture. *Chinese Journal of Information on Traditional Chinese Medicine*, **30**, 145-149.

[23] Li, M. and Zhang, H. (2022) Effect of Acupuncture on Peripheral Neurotransmitters in Patients with Hypertensive Headache. *Journal of Clinical Acupuncture and Moxibustion*, **38**, 23-26.

[24] Chen, H. and Lin, H. (2024) Effect of Acupuncture on Intestinal Flora and Short-Chain Fatty Acid Levels in Hypertensive Rats. *Chinese Journal of Laboratory Animals*, **32**, 345-350.