

Japanese Acupuncture - Current Research

Japanese Traditional Medicine Text (16) – Neurology B

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Headache

1. Acupuncture Indications in Neurological Disorders

The headache symptoms commonly encountered in routine clinical practice are one thing, but there are still many challenges to its pathogenesis, diagnosis and treatment. In 1988, the International Headache Society released a "headache classification" that has been adopted by many clinicians and researchers. However, in 2003, advances in headache research led to revised classification and diagnostic criteria announced by the same society and known as the International Headache Classification Second Edition (ICHD-II) (Table 15)¹⁾. Within this classification the high prevalence of the primary headache migraine and tension-type headache was noted and within Japan accounted for 8.4% and 22.4% of migraine and tension headache sufferers. Further, this data was reported in epidemiological studies in Japan. There is evidence that clinical acupuncture and moxibustion should be considered effective for preventing migraine and tension-type headaches.

So this essay is about prospects and possibilities, and introduces the results of clinical studies of acupuncture treatment on primary headache. The author hopes to promote the current status of clinical research on acupuncture and moxibustion therapy in the pathogenesis of primary headaches both domestically and abroad.

Table 15 International Headache Classification (ICHD-II)

1. Migraine
2. Tension – type headache (TTH)
3. Cluster headache and other trigeminal/autonomic nerve type headaches
4. Other primary headaches
5. Headache attributable to head or neck trauma/ injury
6. Headache attributable to vascular disorder in the head and neck
7. Headache attributable to non-vascular intra-cranial disorder
8. Headache attributable to substance abuse or withdrawal
9. Headache attributable to contagious diseases
10. Headaches attributable to homeostatic disorders
11. Headache attributable to other cranial or facial pain (cranium, neck, eyes, ears, nose, sinuses, teeth, mouth or other location in the face or head)
12. Headache attributable to neurological disorders
13. Cranial neuralgias and facial pain attributable to the central nervous system
14. Other headache, cranial neuralgia, central or primary facial pain

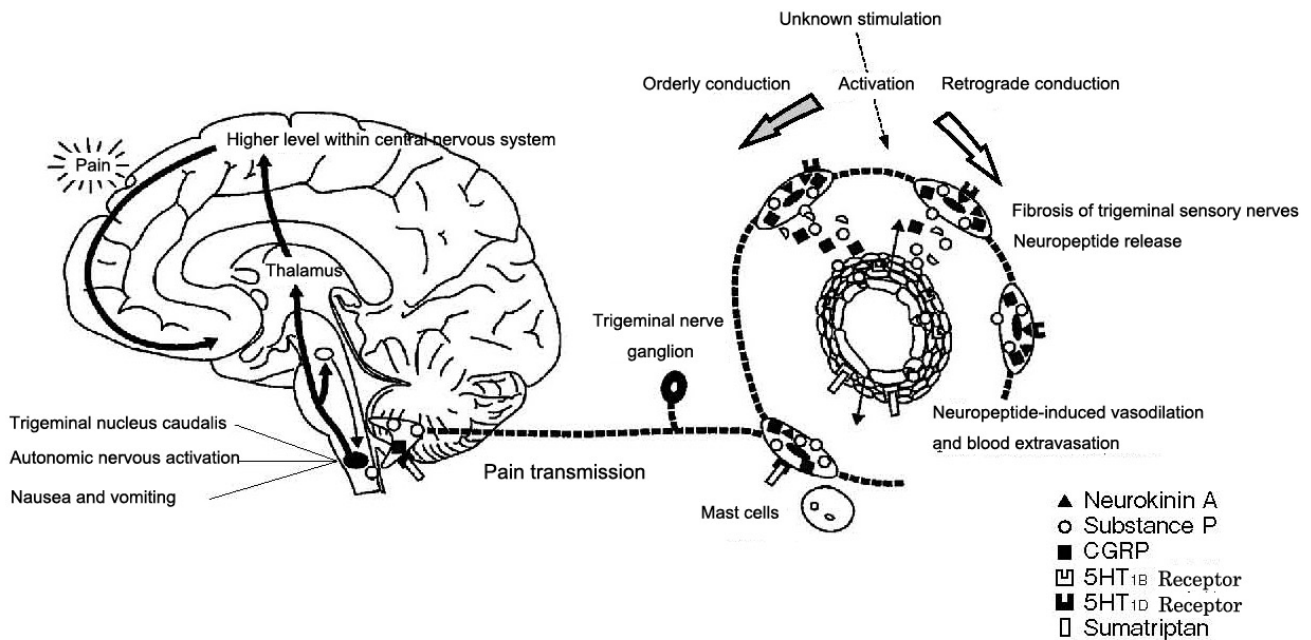


Figure 12 Patient condition of migraine headache

(The author altered the figures of Moskowitz and Goadsby)

1. Pathogenesis of primary headaches a Migraine headache

A study of cerebral blood flow in patients with migraine found decreased cerebral blood flow during the prelude and an increased blood flow during the headache phase. This phenomenon became known as "vascular theory". However, Olesen et al. suggested vascular changes during migraines are not unique, reportedly caused by neurological changes in their cerebral cortex, they are collectively referred to within the "neural theory". On the other hand, Moskowitz et al. investigated the relationship between the trigeminal nerve and vascular intracranial blood vessels, especially blood vessels of the Dura mater. The trigeminal ganglia from unmyelinated C fibers are distributed to the blood vessels of the Dura. Further, they clarified that when the trigeminal nerve was stimulated electrically or chemically, dural vessels showed "neurogenic inflammation" (degranulation of mast cells, vasodilation and plasma protein leakage). This "trigeminovascular system" was thought to mediate "neurogenic inflammation" as a model of migraine headache pathway, thereby reinforcing the trigeminovascular theory (trigeminovascular

theory (Figure 12). That is to say, some stimulation in the axons of the trigeminal nerve in vicinity of the Dura blood vessels, cause the release of neuropeptide (substance P, neurokinin A, CGRP etc.), in turn causing "neurogenic inflammation". It is thought that this process results in trigeminal nerve anterograde and retrograde conduction. The former results in the trigeminal nuclei, at the same site where the c-Fos production is stimulated, the latter is more conducive to the release of neuropeptides that promote blood vessel activity. Until recently, these theories, vascular and neuronal, are considered to be organically combined²⁾. Further, in recent years, central nervous system irritability and instability reflected in the blood vessels, has changed the main concept of pain in the central nervous system. In other words, there apparently exists a "migraine generator", activation of this site in some way causes headaches to occur³⁾. Areas listed as migraine generator locations include nuclei of the thalamus and hypothalamus, raphe nuclei of the brainstem, locus coeruleus and mesencephalic aqueduct within the gray matter.

b Tension headaches

Tension-type headaches result following sustained physical and mental stress leading to contraction of cranial musculature and decreased blood flow. Further, lactic acid and pyruvic acid, by-products of this continued stress are created, exacerbating the pain cycle. This type of pain is due to sympathetic nervous excitation, which allows sustained muscle contraction and a relative insensitivity to pain (elevated pain threshold). This type of headache is also stressful to the body, so once the vicious cycle is established these headaches are often prolonged.

Muscle tension was shown to be involved with tension headaches in 1963, when Wolff used an EMG to show muscle contraction, he then used local anesthetic, relaxing the musculature and relieving the headache. Sakuda⁴⁾ observed lying prone decreased blood flow to muscles and muscle discharge. Further, Sakai et al.⁵⁾ used a muscle hardness method and observed a high level of hardness in the Trapezius and posterior neck muscles. Results of a study⁶⁾ using plethysmography, EMG and thermography revealed that, rather than muscles of the head, tight neck, shoulder and proximal upper back muscle groups play an important role in tension-type headache pathogenesis. These results show, daily clinical examination findings often confirmed the significance of tenderness or induration in muscles of the neck, upper back and shoulder. In 2003 the International Headache Society revised the tension-type headache classification reiterating the importance of pressure pain findings. There are a wide variety of underlying factors causing people to become susceptible to tension-type headache, but tight neck, shoulder and proximal upper back muscle are thought to be deeply involved in the pathogenesis of these headaches.

Kitagawa et al.⁷⁾ suggested that pathogenesis of tension-type headache included not only sustained muscle tension but also mental and emotional stress

that triggers abnormal experience of central nervous system sensations. Anxiety, depression and stress affect the limbic system lowering the pain threshold, leading to spinal inhibitory system disorders, abnormalities in central nervous system neurotransmitters, and decrease in endorphins, etc., critical factors in central and peripheral nervous system pain hypersensitivity contribute to headache and also biochemical factors such as serotonin may be related as well. There are reports of central sensitization related factors of the central nervous system, especially in chronic tension-type headache, the pain threshold was found to be extremely low. Suppression of the temporalis and masseter muscles are related to interneuron in the pons, as seen in the surface EMG potentials (exteroceptive suppression of temporal muscle: ES2) in chronic tension-type headache patients, the brainstem mechanisms point to central sensitization.

2. Clinical studies abroad

Using a PubMed literature search for acupuncture treatment of foreign research on primary headache, we used "acupuncture", "metaanalysis", "migraine" and "tension-type headache" as keywords. Eighty-eight reports were retrieved, however excluding non-drug and alternative therapies for pain, there were only 30 remaining reports. As for acupuncture for migraine headaches, 21 appropriate reports were extracted, and there were 3 appropriate reports discussing migraine treatment for children. Evaluation methods included VAS scale, number of days with headaches and SF – 36 (a multi-purpose, patient-reported short-form health survey) etc. Only one report utilized an economic (treatment cost-effectiveness) evaluation. Acupuncture treatment results for migraine headache showed short term, results were good compared to a standard preventive drug. However, 6 months later the effects were comparable but acupuncture patients reported fewer side effects and no significant difference compared to Sham acupuncture was confirmed. Acupuncture effects on tension-type headache were drawn from 9

reports with 1 of these focusing on children with chronic tension headaches, 1 for adults with chronic tension headaches and the remaining 7 were general tension-type headaches. Evaluation methods were VAS scales, reported number of days with headaches, SF-36 survey, etc. Only one reports included a cost-effectiveness evaluation. Acupuncture treatment results for tension-type headache suggested its usefulness and improved results compared to the standard treatment, although compared with the placebo group, a clear result was not reached. Economic evaluation showed acupuncture to be highly cost-effective for both tension-type and migraine headaches. Also we have already reviewed the effects of acupuncture treatment for pregnancy migraine sufferers when a non-drug therapy is highly desirable. In the future, it will be necessary to consider what effects and limits to treatment will be admitted to any subgroup as we create and design future projects.

3. The condition of domestic clinical research

We carried out a domestic literature search for acupuncture effects on primary headache in Japan and published in major medical journals. Keywords included "headache", "tension-type headache", "migraine", "cluster headache" and "acupuncture treatment". One-hundred twenty-five original reports of headache treated with acupuncture and moxibustion treatment were extracted; 15 tension-type headache, 12 migraine, duplicate studies were excluded. Also only primary headache research was included, research on secondary headaches was excluded from the clinical review. Therapeutic intervention was considered: acupuncture treatment only, combinations with other alternative medical techniques or modalities were excluded. Terms such as muscle tension headache or vascular headache, which did not fit ICHD-II categories of migraine, tension-type headache, and cluster headache, were categorized as "headache" because mixed or multiple symptoms could not be determined from the article.

Literature references on acupuncture treatment for headaches, included 12 for migraine, 14 for tension-type headache, 1 for cluster headache and 19 for headache. Case studies were most common with 14 references, integrated reviews of case studies accounted for 8 reports and only 4 comparative studies were available and these were only concerning acupuncture treatment for patients with tension-type headache. Studies based on RCT or meta-analysis were not available. On the effect of acupuncture treatment for migraine, Liu's⁸⁾ treatment method was found to be significantly effective within certain limits.

Although none of the published clinical research denied the effectiveness of acupuncture and moxibustion therapy for headache, evidence from higher level, well thought-out RCT or CCT studies are desirable.

4. Results of clinical studies in Oriental Medical Center from Saitama Medical University a Migraine headache

1) Effects of acupuncture treatment

Seventy patients who met the ICHD-II classification standards for migraine were given acupuncture treatments for 2 months before the effects were evaluated. Greater than moderate results were reported, patients experienced significantly fewer days with headaches and correlated reduced tenderness of the muscles of the neck and shoulders with their acupuncture treatments.

2) Acupuncture treatment mechanism

Comparing the influence of cerebral blood flow in acupuncture for migraine patients with that of normal subjects, acupuncture was found to be safe and non-invasive even without the use of contrast agents and with repetitive inspections using arterial spin-labeling (ASL) MRI. Results showed migraine patients treated with acupuncture stimulation had increased cerebral blood flow in the thalamus, hypothalamus and pars opercularis, cingulate gyrus and insula during and after the acupuncture

stimulation. On the other hand, a transient increase in blood flow during acupuncture stimulation was confirmed in the healthy subjects. Given these results, while acupuncture on healthy individuals whose cerebral circulation increased in response to the stimulation, preventative acupuncture for migraine attacks may involve stimulating higher levels of the central nervous system.

b Tension-type headache

1) Effects of acupuncture

Other medical department occasionally make clinic requests for acupuncture. Ninety-two tension-type headache patients whose symptoms met the ICHD-II classification criteria were given acupuncture and analysis of the effects of these treatments showed an 82.3% efficacy rate. Also, regarding factors related to the improvement rate of other related symptoms following acupuncture, multiple regression analysis results confirmed satisfaction with the improvement rate for stiff neck and shoulders⁹⁾.

2) Mechanism of Acupuncture^{6, 10, 11)}

As previously mentioned, results from plethysmography, EMG, and thermography shed some light on the mechanisms behind tension-type headache pathogenesis. Rather than muscles of the head or scalp, tight neck, shoulder and proximal upper back muscles play an important role. Published reports suggest acupuncture treatment relaxes these tight muscle groups and improves circulation contributing to the improvement of the headache. Also, using a quantitative measurable open loop video pupillography, a non-invasive inspection method of examining autonomic nervous function, we investigate the mechanism of acupuncture. As a result, acupuncture therapy in patients with tension-type headache, caused pupil dilation greater than pupil constriction showing dominant parasympathetic stimulation. Such reactions to acupuncture are not simply a local reactions (axis axon reflex), higher central nervous system influence is also apparent (Edinger-Westphal

nucleus and Central gray matter) suggesting systemic physiological influences contribute to the improvement of the headache. Also pupillary reaction to acupuncture in normal subjects, created no significant changes, unlike the reaction to acupuncture for tension-type headache patients. Because reactions to acupuncture were different between the healthy individuals and the headache patients it was concluded that acupuncture treatments improve the body's homeostasis.

5. Future prospects

Results of acupuncture treatment for headaches, a large clinical study from Europe indicated ($n=15,056$, RCT or non-randomized cohort), (treatments were continued for 3 months) daily reports of headache frequency decreased from 8.4 days to 4.7 days per month. In comparison, the control group reported headache reduction from 8.1 to 7.5 days, a significant difference in reduction of headaches ($p<0.001$). Additionally, QOL indexes improved more within the acupuncture group¹²⁾. Also in terms of health care cost economy, evaluation shows acupuncture costs to be about € 11,657 a year, QOL compensation and life extension's cost-effect ratio by acupuncture is sufficiently effective and economical¹³⁾. In the update report of the Cochrane review of acupuncture for migraine headache, acupuncture has yet to be proven more or less useful than sham acupuncture (placebo) however, acupuncture treatment cost-effect ratio and QOL compensation were positively confirmed. Importantly, compared with the established effectiveness of preventive drug therapy, acupuncture treatment is equally effective with fewer adverse side-effects. Additionally, patients with tension-type headache confirmed that their headache frequency and severity improved even with sham acupuncture. As expressed above, authors investigating the mechanism of tension-type headache and, over a fixed period, the continued effects of acupuncture treatment continued to reduce the frequency of headaches, and within each health

parameter the authors reported the patient's conditions were approaching normal. Also, the analgesic mechanism of these simple local reactions (axon reflex) and the higher central nervous system have an effect, and clearly the autonomic nervous system plays an important role, acupuncture has a homeostatic reaction, which can scientifically confirm characteristics of traditional medicine¹⁴.

In the future, the purpose of acupuncture treatment should be clarifying the mechanism of action, and even the pathophysiology of these headaches. In recent years, brain hypersensitivity has been introduced, so we should be willing to consider in detail the effects of acupuncture treatment on lowering the pain threshold in the "migraine generator" pain sites (thalamus, hypothalamus, midbrain aqueduct, gray matter, coeruleus and raphe magnus etc.) using ASL and MRI etc., these findings should be involved in clarifying acupuncture treatment effects on higher levels of the central nervous system. In addition, I want to thoroughly clarify and export Japanese acupuncture and the effects of acupuncture and moxibustion for treating migraine with or without an aura and tension-type headache paying special attention to classifying repetitive, frequently recurring and chronic conditions using RCT or CCT.

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