Journal of Systems and Integrative Neuroscience



Review Article ISSN: 2059-9781

Acupuncture as a treatment modality for migraine – a systematic review of the literature

Panagiotis Zogopoulos*, Georgios Vretakos, Anastasios Venetikidis and Dimitrios Rologis

Department of Neurosurgery, Metropolitan Hospital, Athens, Greece

Abstract

Migraine is a debilitating headache disorder associated with rather high healthcare costs and lost work days costs (estimated nearly \$13 billion annually in the USA as a result of 113 million lost work days). Despite numerous drugs available many patients are unresponsive to treatment or suffer from undesirable side-effects of drugs. Acupuncture is a promising treatment modality for migraine that can be used both in combination with drugs or as a stand-alone therapy. We present recent advances regarding ongoing research of acupunture in migraine treatment.

Introduction

Migraine is a rather common and usually debilitating headache disorder that causes heavy socioeconomic burden due to direct and indirect healthcare costs as well as school and work absenteeism. Although there are various pharmacological treatment options (e.g. triptans, ergotamines, NSAIDs,) there is a significant percentage of patients unresponsive to treatment. Moreover, this medication and especially combination drugs are often associated with undesirable side-effects (sleepiness, fatigue, nausea, tachycardia etc.). Therefore, there is an unmet need to establish an alternative treatment for unresponsive migraine patients.

In the United States approximately 23% of households have at least one member suffering from migraine (nearly 18% of women and 6% of men) and the total number of patients is estimated to exceed 28 millions, with half of this population reporting reduced work or school productivity [1].

Acupuncture has been widely used in China for more than 2000 years for the treatment of various pain syndromes including migraine. It is a non-pharmacologic treatment modality that could be beneficial both as a supplementary treatment to current medication (increased effectiveness, drug dose reduction and hence side-effects alleviation) but also as an alternative treatment in drug-unresponsive cases.

Mechanisms of action

Cerebral vasodilation is a well established cause of headache and drugs such as triptans mediate their analgesic action, at least in part, through induction of cerebral vasoconstriction [2,3]. Activation of myosin light chain kinase of cerebral vessels is a significant step in the vasoconstriction process [4]. In an experimental animal model of migraine acupuncture has been found to induce activation of myosin light chain kinase in the middle meningeal artery, indicating its effectiveness in preventing and treating migraine attacks [5].

A randomized, double blind, controlled trial of real versus sham acupuncture in frequent migraineurs showed that acupuncture results in significantly less migraine days and pain intensity and increased pain thresholds [6]. No severe adverse effects were reported in the trial. These results were maintained at three-month follow-up, but not at one-year follow up, suggesting that acupuncture is an effective and safe treatment for short-term relief of frequent migraines and that periodical acupuncture sessions might be necessary to prolong the therapeutic effect [6].

In a clinical study utilizing resting-state functional magnetic resonance imaging (fMRI) scanning between migraine without aura patients and healthy controls functional connectivity of the right frontoparietal network was found significantly decreased among migraine patients [7]. Intrinsicly decreased functional connectivity could be reversed after 4 weeks of acupuncture treatment suggesting yet another therapeutic action of acupuncture [7].

Another randomized controlled trial also using resting-state fMRI in patients with migraine showed that acupuncture can regulate some migraine-affected key regions as well as the pain circuitry of the brain and cognitive components of pain processing [8].

Serum nitric oxide (NO) levels (a potent vasodilator contributing to headache) have been found nearly 55% higher in migraine patients compared to healthy controls [9]. Acupuncture treatment can significantly decrease serum NO levels in migraine patients as early as the 5th session and its effects were found to be cumulative with consequent sessions [9].

Acupuncture treatment has been found to significantly decrease matrix metalloproteinase-2 (MMP-2) activity in patients with migraine, without affecting MMP-2 concentrations thus, the analgesic effect of acupuncture might be also associated with this decrease [10].

Correspondence to: Panagiotis Zogopoulos, Address: 69 Vosporou str., Athens, Greece, P.O. Box: 10444, Tel: +306976053555; E-mail: p.zogopoulos@yahoo.com

Key words: acupuncture, migraine, analgesia, treatment

Received: January 02, 2016; Accepted: January 18, 2016; Published: January 21, 2016

J Syst Integr Neurosci, 2016 doi: 10.15761/JSIN.1000115 Volume 2(1): 85-86

Experimental animal studies (using rats) have concluded that acupuncture combined with electrical stimulation of the needles (electroacupuncture) can decrease plasma glutamate levels (which were found significantly increased in rats during acute migraine attacks) thereby relieving pain [11].

Finally, endocannabinoid system activation, which has been proven to exert analgesia and neuroprotection [12,13] is believed to be another mechanism of action of acupuncture on migraine patients [14].

Discussion

Migraine is a common, debilitating pain disorder and current medications do not always achieve sufficient analgesia. Modern research has shown that acupuncture can be a safe and effective treatment for migraine either supplementary to mainstream pharmaceutical treatment or as an alternative stand-alone modality. Severe adverse effects seldom occur during acupuncture treatment which emphasizes its safety profile. The major therapeutic benefit of acupuncture is that it significantly decreases frequency, duration and pain intensity of migraine attacks [15].

Conclusions

Acupuncture has been found to be at least as effective as conventional preventative pharmacologic treatment for migraine [6,16]. It does not only relieve the pain of migraine but also improves the psychological profile of patients [17]. Moreover, it is safe, cost-effective, long lasting and contributes significantly to the improvement of patients' quality of life.

References

- Lipton RB, Stewart WF, Diamond S, Diamond ML, Reed M (2001) Prevalence and burden of migraine in the United States: data from the American Migraine Study II. Headache 41: 646-657. [Crossref]
- Humphrey PP, Feniuk W (1991) Mode of action of the anti-migraine drug sumatriptan. Trends Pharmacol Sci 12: 444-446. [Crossref]
- Jansen I, Edvinsson L, Mortensen A, Olesen J (1992) Sumatriptan is a potent vasoconstrictor of human dural arteries via a 5-HT1-like receptor. *Cephalalgia* 12: 202-205. [Crossref]
- 4. Nilsson T, Longmore J, Shaw D, Olesen IJ, Edvinsson L (1999) Contractile 5-HT1B

- receptors in human cerebral arteries: pharmacological characterization and localization with immunocytochemistry. *Br J Pharmacol* 128: 1133-1140. [Crossref]
- Zhou P, Wang A, Li B, Liu C, Wang Y (2015) Effect of acupuncture at Fengchi (GB 20) on the activity of myosin light chain kinase in the middle meningeal artery of migraine modeled rats. J Tradit Chin Med 35: 301-305. [Crossref]
- Wang Y, Xue CC, Helme R, Da Costa C, Zheng Z (2015) Acupuncture for Frequent Migraine: A Randomized, Patient/Assessor Blinded, Controlled Trial with One-Year Follow-Up. Evid Based Complement Alternat Med 2015: 920353. [Crossref]
- Li K, Zhang Y, Ning Y, Zhang H, Liu H, et al. (2015) The effects of acupuncture treatment on the right frontoparietal network in migraine without aura patients. J Headache Pain 16: 518. [Crossref]
- Zhao L, Liu J, Zhang F, Dong X, Peng Y, et al. (2014) Effects of long-term acupuncture treatment on resting-state brain activity in migraine patients: a randomized controlled trial on active acupoints and inactive acupoints. *PloS One* 9: e99538. [Crossref]
- Gündüztepe Y, Mit S, Geçioglu E, Gurbuz N, Salkaci O, et al. (2014) The impact of acupuncture treatment on nitric oxide (NO) in migraine patients. Acupunct Electrother Res 39: 275-283. [Crossref]
- Cayir Y, Ozdemir G, Celik M, Aksoy H, Akturk Z, et al. (2014) Acupuncture decreases matrix metalloproteinase-2 activity in patients with migraine. *Acupunct Med* 32: 376-380. [Crossref]
- Gao Z, Liu X, Yu S, Zhang Q, Chen Q, et al. (2014) Electroacupuncture at Acupoints Reverses Plasma Glutamate, Lipid, and LDL/VLDL in an Acute Migraine Rat Model: A (1) H NMR-Based Metabolomic Study. Evid Based Complemet Alternat Med 2014: 659268. [Crossref]
- Zogopoulos P, Vasileiou I, Patsouris E, Theocharis SE (2013) The role of endocannabinoids in pain modulation. Fundam Clin Pharmacol 27: 64-80. [Crossref]
- Zogopoulos P, Vasileiou I, Patsouris E, Theocharis S (2013) The neuroprotective role
 of endocannabinoids against chemical-induced injury and other adverse effects. *J Appl Toxicol* 33: 246-264. [Crossref]
- McPartland JM, Guy GW, Di Marzo V (2014) Care and feeding of the endocannabinoid system: a systematic review of potential clinical interventions that upregulate the endocannabinoid system. PLoS One 9: e89566. [Crossref]
- Plank S, Goodard JL, Pasierb L, Simunich TJ, Croner JR (2013) Standardized set-point acupuncture for migraines. Altern Ther Health Med 19: 32-37. [Crossref]
- Da Silva AN (2015) Acupuncture for migraine prevention. Headache 55: 470-473.
 [Crossref]
- Vijayalakshmi I, Shankar N, Saxena A, Bhatia MS (2014) Comparison of effectiveness
 of acupuncture therapy and conventional drug therapy on psychological profile
 ofmigraine patients. *Indian J Physiol Pharmacol* 58: 69-76. [Crossref]

Copyright: ©2015 Zogopoulos P. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

J Syst Integr Neurosci, 2016 doi: 10.15761/JSIN.1000115 Volume 2(1): 85-86