Washington State Health Care Authority

Health Technology Assessment

Acupuncture for Chronic Migraine and Chronic Tension-type Headache

Appendix

February 23, 2022

Health Technology Assessment Program (HTA)
Washington State Health Care Authority
PO Box 42712
Olympia, WA 98504-2712
(360) 725-5126
hca.wa.gov/hta
shtap@hca.wa.gov

Acupuncture for Chronic Migraine and Chronic Tension-type Headache

Aggregate Analytics, Inc.

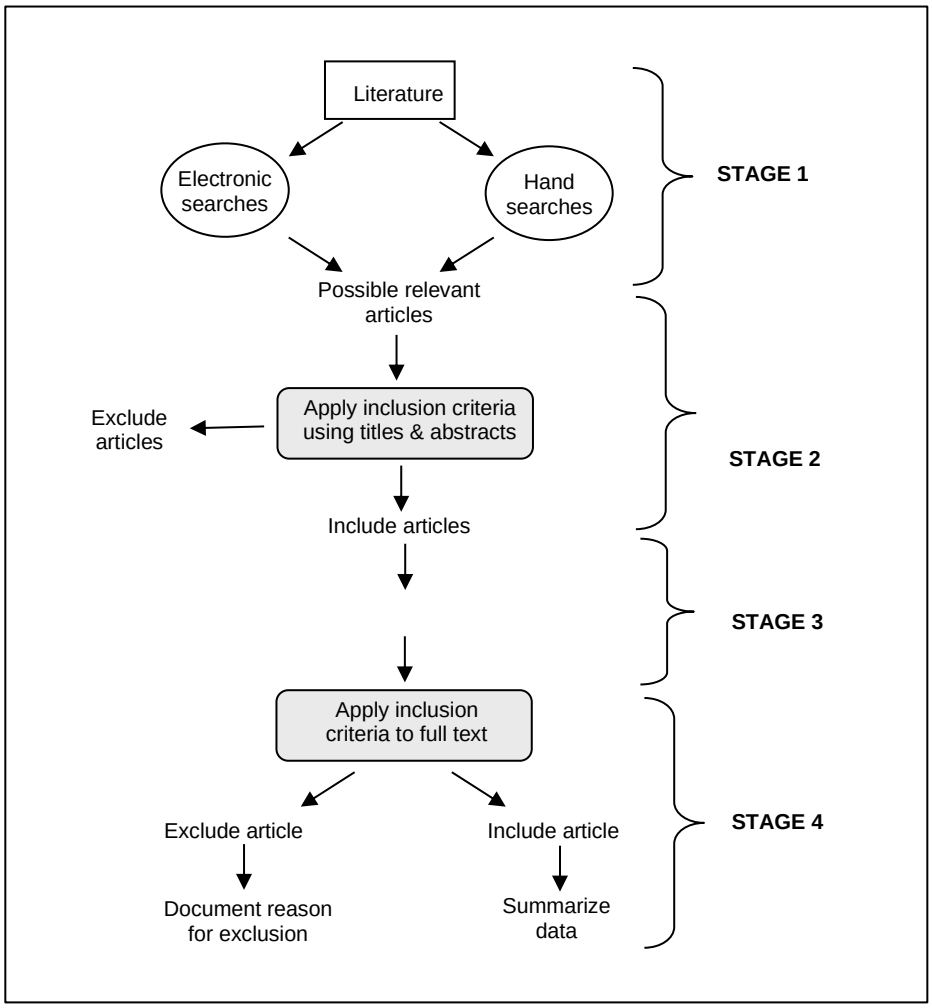
Appendix

February 23, 2022

Table of Contents

Appendix Tables

APPENDIX A. Algorithm for Article Selection



APPENDIX B. Search Strategies

Below are the search strategies used to search the PubMed and Cochrane Central databases. Keyword searches were conducted in the other listed resources. In addition, hand-searching of included studies was performed.

Cochrane CENTRAL Search Strategy

Search number	Search terms	Number of hits
#1	MeSH descriptor: [Headache] this term only	2495
#2	MeSH descriptor: [Headache Disorders] this term only	141
#3	MeSH descriptor: [Migraine Disorders] this term only	2705
#4	MeSH descriptor: [Tension-Type Headache] this term only	314
#5	"tension headache":ti,kw,ab	652
#6	migrain*:ti,kw,ab	8546
#7	tension*:ti,kw,ab	11509
#8	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7	21488
#9	*acupuncture:ti,kw,ab	16713
#10	#8 AND #9	658
#11	#8 AND #9 (Custom year range: 2016 to 2021)	198

PubMed Search Strategy

Search number	Search terms	Number of hits
#1	Headache Disorders[MeSH] OR Headache Disorders, Primary[MeSH] OR Tension-Type Headache[MeSH] OR Migraine Disorders[MeSH] OR Headache/therapy [MeSH] OR "tension headache"[TIAB] OR "migraine"[TIAB] OR migrain*[TIAB] OR tension*[TIAB]	169960
#2	Acupuncture[MeSH] OR Acupuncture Therapy[MeSH] OR "acupuncture"[TIAB] OR "acupuncture therapy"[TIAB] OR "manual acupuncture"[TIAB] OR "electroacupuncture"[TIAB] OR "auricular acupuncture"[TIAB] OR "eye acupuncture"[TIAB] or "scalp acupuncture"[TIAB] OR acupunct*[TIAB] OR acupuncture*[TIAB] OR electroacupunct*[TIAB] OR electro-acupunct*[TIAB]	34108
#3	#1 AND #2 Filters: Abstract, from 2016/7/1 - 2021/11/17	280

Embase Search Strategy

Search number	Search terms	Number of hits
#1	('headache'/exp OR 'headache disorders' OR 'migraine'/exp OR 'migraine disorders' OR 'tension headache'/exp OR 'headache, tension' OR 'tension headache' OR 'tension headaches' OR 'tension type headache' OR 'tension type headaches' OR 'tension-type headache' OR 'chronic daily headache'/exp OR 'chronic daily headache' OR 'chronic daily headaches' OR 'daily chronic headache') AND ('acupuncture'/exp OR 'acupuncture' OR 'acupuncture therapy') AND [2016-2021]/py	921
#2	AND ([adult]/lim OR [aged]/lim OR [middle aged]/lim OR [very elderly]/lim OR [young adult]/lim) AND ('article'/it OR 'review'/it)	331

Total hits from combined search results: 809
Total after deduplication: 659
Total found via hand searching: 6

APPENDIX C. Excluded Articles

Articles excluded as primary studies after full text review, with reason for exclusion.

Appendix Table C1. List of Excluded Articles

	Citation	Reason for exclusion
1.	Ke HK, Tu SH, Shen YJ, Qu QW. [Effect of ZHU Lian's type Ⅱ inhibition acupuncture on chronic migraine and serum 5-HT, VEGF, CGRP]. Zhongguo Zhen Jiu 2021;41:1079-83.	Non-English language
2.	Liao CC, Liao KR, Lin CL, Li JM. Long-Term Effect of Acupuncture on the Medical Expenditure and Risk of Depression and Anxiety in Migraine Patients: A Retrospective Cohort Study. Front Neurol 2020;11:321.	Ineligible outcomes
3.	Mata J, Sanchís P, Valentí P, Hernández B, Aguilar JL. Treatment of headache disorders with acupuncture: a 6-year retrospective study. Acupunct Med 2021;39:452-60.	Ineligible population
4.	Moretto Rafaela G, Favarin Thais S, Neves M, Vasconcellos Paula Renata O, Bertolini Gladson Ricardo F. Use of Laser Acupuncture in Chronic Tensional Headache: randomized Clinical Trial^ien Uso do Laser Acupuntura na Cefaleia Tensional Crônica: ensaio Clínico Randomizado^ipt. J health sci (londrina) 2021;23:141-4.	Ineligible outcomes
5.	Schiller J, Karst M, Kellner T, et al. Combination of acupuncture and medical training therapy on tension type headache: results of a randomised controlled pilot study. Cephalalgia 2021.	Ineligible population
6.	Zhao L, Chen J, Li Y, et al. The Long-term Effect of Acupuncture for Migraine Prophylaxis: a Randomized Clinical Trial. JAMA internal medicine 2017;177:508-15.	Ineligible population
7.	Allais G, Sinigaglia S, Airola G, et al. Ear acupuncture in the prophylactic treatment of chronic migraine. Neurol Sci 2019;40:211-2.	Ineligible study design
8.	Bicer M, Bozkurt D, Cabalar M, et al. The clinical efficiency of acupuncture in preventing migraine attacks and its effect on serotonin levels. Turkiye fiziksel tip ve rehabilitasyon dergisi 2017;63:59-65.	Ineligible population
9.	Gildir S, Tüzün EH, Eroğlu G, Eker L. A randomized trial of trigger point dry needling versus sham needling for chronic tension-type headache. Medicine 2019;98:e14520.	Ineligible intervention
10.	Kamali F, Mohamadi M, Fakheri L, Mohammadnejad F. Dry needling versus friction massage to treat tension type headache: A randomized clinical trial. Journal of bodywork and movement therapies 2019;23:89-93.	Ineligible intervention
11.	Wang J, Qin X, Xie W, Wang W. [Migraine without aura treated with balance acupuncture therapy: a randomized controlled trial]. Zhongguo Zhen Jiu. 2017 Aug 12;37(8):805-809. Chinese. doi: 10.13703/j.0255-2930.2017.08.002. PMID: 29231337.	Non-English language
12.	Mayrink WC, Garcia JBS, Dos Santos AM, Nunes J, Mendonça THN. Effectiveness of Acupuncture as Auxiliary Treatment for Chronic Headache. Journal of acupuncture and meridian studies 2018;11:296-302.	Ineligible population
13.	Tastan K, Ozer Disci O, Set T. A Comparison of the Efficacy of Acupuncture and Hypnotherapy in Patients With Migraine. Int J Clin Exp Hypn 2018;66:371-85.	Ineligible population

	Citation	Reason for exclusion
14.	Xu S, Yu L, Luo X, et al. Manual acupuncture versus sham acupuncture and usual care for prophylaxis of episodic migraine without aura: multicentre, randomised clinical trial. BMJ (Clinical research ed) 2020;368:m697.	Ineligible population
15.	Nie L, Cheng J, Wen Y, Li J. The Effectiveness of Acupuncture Combined with Tuina Therapy in Patients with Migraine. Complementary medicine research 2019;26:182-94.	Ineligible population
16.	Vickers AJ, Vertosick EA, Lewith G, et al. Acupuncture for Chronic Pain: Update of an Individual Patient Data Meta-Analysis. J Pain 2018;19:455-74.	Individual patient data systematic review; ineligible population
17.	Li, Z., Liu, M., Lan, L., Zeng, F., Makris, N., Liang, Y., . . . Kong, J. (2016). Altered periaqueductal gray resting state functional connectivity in migraine and the modulation effect of treatment. Sci Rep, 6, 20298. doi:10.1038/srep20298	Ineligible population
18.	Li Z, Zeng F, Yin T, et al. Acupuncture modulates the abnormal brainstem activity in migraine without aura patients. Neuroimage Clinical 2017;15:367-75.	Ineligible population
19.	Cevoli S, Giannini G, Favoni V, et al. A randomized controlled clinical trial on the efficacy of acupuncture for migraine prophylaxis: the ACUMIGRAN study. Cephalalgia 2017;37:97.	Ineligible study design
20.	Ishiyama S, Shibata Y, Ayuzawa S, Matsushita A, Matsumura A. Clinical Effect of C2 Peripheral Nerve Field Stimulation Using Electroacupuncture for Primary Headache. Neuromodulation 2018;21:793-6.	Ineligible study design
21.	Kamavosyan A. Complex Approach to the Chronic Migraine Treatment: connection Between Western and Oriental Medicine. JAMS journal of acupuncture and meridian studies 2020;13:70-1.	Ineligible study design
22.	Kenan Tastan, Ozlem Ozer Disci, Set T. A Comparison of the Efficacy of Acupuncture and Hypnotherapy in Patients With Migraine. International journal of clinical and experimental hypnosis 2018;66:371-85.	Ineligible study design
23.	Liu B. Clinical efficacy of electric acupuncture therapy in the treatment of patients with migraine. China foreign medical treatment [zhong wai yi liao za zhi] 2016:7-9.	Ineligible population
24.	Liu L, Zhao LP, Zhang CS, et al. Acupuncture as prophylaxis for chronic migraine: a protocol for a single-blinded, double-dummy randomised controlled trial. BMJ open 2018;8.	Ineligible study design
25.	Zou Y, Tang W, Li X, Xu M, Li J. Acupuncture Reversible Effects on Altered Default Mode Network of Chronic Migraine Accompanied with Clinical Symptom Relief. Neural Plast 2019;2019:5047463.	Ineligible study design
26.	Giannini G, Favoni V, Merli E, et al. A Randomized Clinical Trial on Acupuncture Versus Best Medical Therapy in Episodic Migraine Prophylaxis: the ACUMIGRAN Study. Frontiers in neurology 2021;11:9.	Ineligible population
27.	Bäumler P, Zhang W, Stübinger T, Irnich D. Acupuncture-related adverse events: Systematic review and meta-analyses of prospective clinical studies. BMJ Open 2021;11.	SR - acupuncture adverse events; not specific to headache

	Citation	Reason for exclusion
28.	Fan SQ, Jin S, Tang TC, Chen M, Zheng H. Efficacy of acupuncture for migraine prophylaxis: a trial sequential meta-analysis. J Neurol 2021;268:4128-37.	SR - Includes studies of both episodic and chronic headache; does not report data separately for chronic headache
29.	Kolokotsios S, Stamouli A, Koukoulithras I, Plexousakis M, Drousia G. The Effectiveness of Acupuncture on Headache Intensity and Frequency in Patients With Tension-Type Headache: A Systematic Review and Meta-Analysis. Cureus 2021;13:e14237.	SR - Includes studies of both episodic and chronic headache; does not report data separately for chronic headache
30.	Turkistani A, Shah A, Jose AM, et al. Effectiveness of Manual Therapy and Acupuncture in Tension-Type Headache: A Systematic Review. Cureus 2021;13:e17601.	SR - Includes studies of both episodic and chronic headache; does not report data separately for chronic headache
31.	Zhao T, Guo J, Song Y, et al. A Bibliometric Analysis of Research Trends of Acupuncture Therapy in the Treatment of Migraine from 2000 to 2020. J Pain Res 2021;14:1399-414.	Bibliometric assessment
32.	Zheng H, Huang SL, Chen YY, Tang TC, Qin D, Chen M. Topiramate, acupuncture, and BoNT-A for chronic migraine: a network meta-analysis. Acta Neurol Scand 2021;143:558-68.	Network meta-analysis
33.	Chen YY, Li J, Chen M, Yue L, She TW, Zheng H. Acupuncture versus propranolol in migraine prophylaxis: an indirect treatment comparison meta-analysis. J Neurol 2020;267:14-25.	SR - Includes studies of both episodic and chronic headache; does not report data separately for chronic headache
34.	Giovanardi CM, Cinquini M, Aguggia M, et al. Acupuncture vs. Pharmacological Prophylaxis of Migraine: A Systematic Review of Randomized Controlled Trials. Front Neurol 2020;11:576272.	SR - Includes studies of both episodic and chronic headache; does not report data separately for chronic headache
35.	Huang J, Shen M, Qin X, Guo W, Li H. Acupuncture for the Treatment of Tension-Type Headache: An Overview of Systematic Reviews. Evid Based Complement Alternat Med 2020;2020:4262910.	Systematic review of systematic reviews
36.	Lu T, Lu C, Li H, et al. The reporting quality and risk of bias of randomized controlled trials of acupuncture for migraine: Methodological study based on STRICTA and RoB 2.0. Complement Ther Med 2020;52:102433.	SR - Includes studies of both episodic and chronic headache; does not report data separately for chronic headache; focused on quality of studies
37.	Ni X, Dong L, Tian T, et al. Acupuncture versus Various Control Treatments in the Treatment of Migraine: A Review of Randomized Controlled Trials from the Past 10 Years. J Pain Res 2020;13:2033-64.	SR - Includes studies of both episodic and chronic headache; does not report data separately for chronic headache
38.	Ou MQ, Fan WH, Sun FR, et al. A Systematic Review and Meta-analysis of the Therapeutic Effect of Acupuncture on Migraine. Front Neurol 2020;11:596.	SR - Unclear if included studies are episodic or chronic
39.	Zhang N, Houle T, Hindiyeh N, Aurora SK. Systematic Review: Acupuncture vs Standard Pharmacological Therapy for Migraine Prevention. Headache 2020;60:309-17.	Narrative review
40.	Li X, Dai Q, Shi Z, et al. Clinical Efficacy and Safety of Electroacupuncture in Migraine Treatment: A Systematic Review and Network Meta-Analysis. Am J Chin Med 2019;47:1755-80.	SR - Unclear if included studies are episodic or chronic
41.	Xu J, Zhang FQ, Pei J, Ji J. Acupuncture for migraine without aura: a systematic review and meta-analysis. J Integr Med. 2018	SR -All included studies published prior to prior report

	Citation	Reason for exclusion
	Sep;16(5):312-321. doi: 10.1016/j.joim.2018.06.002. Epub 2018 Jun 28. PMID: 30007828.	
42.	Jiang Y, Bai P, Chen H, et al. The Effect of Acupuncture on the Quality of Life in Patients With Migraine: A Systematic Review and Meta-Analysis. Front Pharmacol 2018;9:1190.	SR - Unclear if included studies are episodic or chronic
43.	Zhao Z, Se JH, Shi G, Li N. The observation on different effectiveness between the embedding needle therapy and medication in the preventative treatment of chronic migraine. World Journal of Acupuncture - Moxibustion 2018;28:242-5.	Ineligible comparator

APPENDIX D. Risk of Bias, Strength of Evidence, and QHES Determination

Each included comparative study is rated against pre-set criteria that resulted in a Risk of Bias (RoB) assessment and presented in a table. Definitions of the RoB categories are provided in Table D1, and criteria for determining RoB for primary studies of therapy are listed in the Table D2. Table D3 provides an example of the format used to assess RoB for individual cohort studies of therapy. A "No" indicates that the criterion was not met; an "Unclear" indicates that the criterion could not be determined with the information provided or was not reported by the author. Risk of bias assessments were not conducted for case series; all were considered High risk of bias.

Appendix Table D1. Definition of the risk of bias categories

Risk of Bias	Definition
Low risk of bias	Study adheres to commonly held tenets of high-quality design, execution and avoidance of bias
Moderately low risk of bias	Study has potential for some bias; does not meet all criteria for low risk of bias but deficiencies not likely to invalidate results or introduce significant bias
Moderately high risk of bias	Study has flaws in design and/or execution that increase potential for bias that may invalidate study results
High risk of bias	Study has significant potential for bias; does not include design features geared toward minimizing bias and/or does not have a comparison group

Appendix Table D2. Definitions of the different levels of evidence for studies of therapy

Risk of Bias	Studies of Therapy*	
	Study design	**Criteria***
Low risk: Study adheres to commonly held tenets of high quality design, execution and avoidance of bias	Good quality RCT	• Random sequence generation • Statement of allocation concealment • Intent-to-treat analysis • Blind or independent assessment for primary outcome(s) • F/U rate of 80%+ • <10% difference in F/U between groups • Controlling for possible confounding‡
Moderately low risk: Study has potential for some bias; study does not meet all criteria for class I, but deficiencies not likely to invalidate results or introduce significant bias	Moderate quality RCT	• Violation of one or two of the criteria for good quality RCT
	Good quality cohort	• Blind or independent assessment for primary outcome(s) • F/U rate of 80%+ • <10% difference in F/U between groups • Controlling for possible confounding‡
Moderately High risk: Study has significant flaws in design and/or execution that increase potential for bias that may invalidate study results	Poor quality RCT	• Violation of three or more of the criteria for good quality RCT
	Moderate quality cohort	• Violation of any of the criteria for good quality cohort
	Case-control	• Any case-control design
High risk: Study has significant potential for bias; lack of comparison group precludes direct assessment of important outcomes	Poor quality cohort Case series	• Violation of two or more criteria for a good quality cohort • Any case series design

* Additional domains evaluated in studies performing a formal test of interaction for subgroup modification (i.e., HTE) based on recommendations from Oxman and Guyatt:[2,4]

- Is the subgroup variable a characteristic specified at baseline or after randomization? (subgroup hypotheses should be developed a priori)
- Did the hypothesis precede rather than follow the analysis and include a hypothesized direction that was subsequently confirmed?
- Was the subgroup hypothesis one of a smaller number tested?

† Outcome assessment is independent of healthcare personnel judgment. Reliable data are data such as mortality or re-operation.

‡ Authors must provide a description of robust baseline characteristics, and control for those that are unequally distributed between treatment groups.

Appendix Table D3: Assessment of RoB for individual studies of therapy

Methodological Principle	Author 1, 2014	Author 2, 2012	Author 3, 2010
Study design			
Randomized controlled trial	■	■	■
Prospective cohort study			
Retrospective cohort study			
Case-control			
Case-series			
Random sequence generation*	Yes	No	Yes
Concealed allocation*	Unclear‡	No	Yes
Intention to treat*	Yes	Yes	Yes
Independent or blind assessment	No§	Yes	Yes
Co-interventions applied equally	Yes	No	Yes
Complete follow-up of ≥80%	Yes**	Yes	Yes
<10% difference in follow-up between groups	Yes	No	Yes
Controlling for possible confounding†	Yes	Yes	Yes
Risk of Bias	Moderately Low	Moderately High	Low

*Applies to randomized controlled trials only.
†Authors must provide a description of robust baseline characteristics, and control for those that are unequally distributed between treatment groups.
‡Authors state that allocation occurred via envelopes prepared by a study coordinator; however, they did not specify that the envelopes were opaque so the study did not receive credit for this criterion.
§An independent critical events committee adjudicated all clinical end points in a blinded fashion for the initial two thirds of events. However, there was a delay in adjudicating the final one third of events which were adjudicated without blinding.
**For primary outcome at 12 months (end of study) 89% follow-up, criterion met; for primary outcome at additional 24 months follow up was 73%, criterion not met for 24 months.

Determination of Overall Strength (Quality) of Evidence

The strength of evidence for the overall body of evidence for all *critical health outcomes* was assessed by one researcher following the principles for adapting GRADE (Grades of Recommendation Assessment, Development and Evaluation) as outlined by the Agency for Healthcare Research and Quality (AHRQ).[1] The strength of evidence was based on the highest quality evidence available for a given *primary* outcome. In determining the strength of body of evidence regarding a given *primary* outcome, the following domains were considered:

- **Risk of bias:** the extent to which the included studies have protection against bias.
- **Consistency:** the degree to which the included studies report results are similar in terms of range and variability.
- **Directness:** describes whether the evidence is directly related to patient health outcomes.
- **Precision:** describes the level of certainty surrounding the effect estimates.
- **Publication bias:** is considered when there is concern of selective publishing.

All AHRQ "required" and "additional" domains (risk of bias, consistency, directness, precision, and if possible, publication bias) were assessed. Bodies of evidence consisting of RCTs were initially considered as High strength of evidence (SoE), while those that comprised nonrandomized studies began as Low strength of evidence. The strength of evidence could be downgraded based on the limitations described above. There could also be situations where the *nonrandomized* studies could be upgraded, including the presence of plausible unmeasured confounding and bias that would decrease an observed effect or increase an effect if none was observed, presence of a dose-response relationship, and large magnitude of effect (strength of association) *if no downgrades for domains above*. Publication and reporting bias are difficult to assess. Publication bias is particularly difficult to assess with fewer than 10 RCTs (AHRQ methods guide). When publication bias was unknown in all studies and this domain is often eliminated from the strength of evidence tables for our reports. The final strength of evidence for each **primary** outcome was assigned an overall grade of high, moderate, low, or insufficient, which are defined as follows:

High— Very confident that effect size estimates lie close to the true effect for this outcome; there are few or no deficiencies in the body of evidence; we believe the findings are stable.

Moderate— Moderately confident that effect size estimates lie close to the true effect for this outcome; some deficiencies in the body of evidence; we believe the findings are probably stable but some doubt remains.

Low— Limited confidence that effect size estimates lie close to the true effect for this outcome; important or numerous deficiencies in the body of evidence; we believe that additional evidence is needed before concluding that findings are stable or that the estimate is close to the true effect.

Insufficient— We have no evidence, are unable to estimate an effect or have no confidence in the effect estimate for this outcome; OR no available evidence or the body of evidence has unacceptable deficiencies precluding judgment.

Similar methods for determining the overall quality (strength) of evidence related to economic studies have not been reported, thus the overall strength of evidence for outcomes reported in Key Question 4 was not assessed.

Appendix Table D4. Example methodology outline for determining overall strength of evidence (SoE):

All AHRQ "required" and "additional" domains* are assessed. Only those that influence the baseline grade are listed in table below.

Baseline strength: HIGH = RCTs. LOW = observational, cohort studies, administrative data studies.

DOWNGRADE: Risk of bias for the individual article evaluations (1 or 2); Inconsistency** of results (1 or 2); Indirectness of evidence (1 or 2); Imprecision of effect estimates (1 or 2); Sub-group analyses not stated *a priori* and no test for interaction (2)

UPGRADE (non-randomized studies): Large magnitude of effect (1 or 2); Dose response gradient (1) done for observational studies ***if no downgrade for domains above***

Outcome	Strength of Evidence	Conclusions & Comments	Baseline SOE	DOWNGRADE	UPGRADE
Outcome	**HIGH**	Summary of findings	**HIGH** RCTs	**NO** consistent, direct, and precise estimates	**NO**
Outcome	**MODERATE**	Summary of findings	**LOW** Cohort studies	**NO** consistent, direct, and precise estimates; high quality (moderately low ROB)	**YES** Large effect
Outcome	**LOW**	Summary of findings	**HIGH** RCTs	**YES (2)** Inconsistent Indirect	**NO**

*Required domains: risk of bias, consistency, directness, precision. Plausible confounding that would decrease observed effect is accounted for in our baseline risk of bias assessment through individual article evaluation. Additional domains: dose-response, strength of association, publication bias.

**Single study = "consistency unknown", may or may not be downgraded

Assessment of Economic Studies

Full formal economic analyses evaluate both costs and clinical outcomes of two or more alternative interventions. The four primary types are cost minimization analysis (CMA), cost-utility analysis (CUA), cost-effectiveness analysis (CEA), and cost-benefit analyses (CBA). Each employs different methodologies, potentially complicating critical appraisal, but some common criteria can be assessed across studies.

No standard, universally accepted method of critical appraisal of economic analyses is currently in use. A number of checklists [Canadian, BMJ, AMA] are available to facilitate critique of such studies. The Quality of Health Economic Studies (QHES) instrument developed by Ofman, et al.[3] QHES embodies the primary components relevant for critical appraisal of economic studies. It also incorporates a weighted scoring process and which was used as one factor to assess included economic studies. This tool has not yet undergone extensive evaluation for broader use but provides a valuable starting point for critique.

In addition to assessment of criteria in the QHES, other factors are important in critical appraisal of studies from an epidemiologic perspective to assist in evaluation of generalizability and potential sources of study bias.

Such factors include:

- Are the interventions applied to similar populations (e.g., with respect to age, gender, medical conditions, etc.)? To what extent are the populations for each intervention comparable and are differences considered or accounted for? To what extent are population characteristics consistent with "real world" applications of the comparators?
- Are the sample sizes adequate so as to provide a reasonable representation of individuals to whom the technology would be applied?
- What types of studies form the basis for the data used in the analyses? Data (e.g., complication rates) from randomized controlled trials or well-conducted, methodologically rigorous cohort studies for data collection are generally of highest quality compared with case series or studies with historical cohorts.
- Were the interventions applied in a comparable manner (e.g., similar protocols, follow-up procedures, evaluation of outcomes, etc.)?
- How were the data and/or patients selected or sampled (e.g., a random selection of claims for the intervention from a given year/source or all claims)? What specific inclusion/exclusion criteria or processes were used?
- Were the outcomes and consequences of the interventions being compared comparable for each? (e.g., were all of the relevant consequences/complications for each intervention considered or do they primarily reflect those for one intervention?

Appendix Table D5. Methodology outline for determining QHES

Question	*STUDY AUTHOR AND YEAR:*	Points Possible
1	1. Was the study objective presented in a clear, specific, and measurable manner?	7
2	2. Were the perspective of the analysis (societal, third-party payer, etc.) and reasons for its selection stated?	4
3	3. Were variable estimates used in the analysis from the best available source (i.e., randomized controlled trial - best, expert opinion - worst)?	8
4	4. If estimates came from a subgroup analysis, were the groups prespecified at the beginning of the study?	1
5	5. Was uncertainty handled by (1) statistical analysis to address random events, (2) sensitivity analysis to cover a range of assumptions?	9
6	6. Was incremental analysis performed between alternatives for resources and costs?	6
7	7. Was the methodology for data abstraction (including the value of health states and other benefits) stated?	5
8	8. Did the analytic horizon allow time for all relevant and important outcomes? Were benefits and costs that went beyond 1 year discounted (3% to 5%) and justification given for the discount rate?	7
9	9. Was the measurement of costs appropriate and the methodology for the estimation of quantities and unit costs clearly described?	8
10	10. Were the primary outcome measure(s) for the economic evaluation clearly stated and did they include the major short-term, long-term and negative outcomes included?	6
11	11. Were the health outcomes measures/scales valid and reliable? If previously tested valid and reliable measures were not available, was justification given for the measures/scales used?	7
12	12. Were the economic model (including structure), study methods and analysis, and the components of the numerator and denominator displayed in a clear, transparent manner?	8
13	13. Were the choice of economic model, main assumptions, and limitations of the study stated and justified?	7
14	14. Did the author(s) explicitly discuss direction and magnitude of potential biases?	6
15	15. Were the conclusions/recommendations of the study justified and based on the study results?	8
16	16. Was there a statement disclosing the source of funding for the study?	3
TOTAL		100

APPENDIX E. Study Quality: Risk of Bias evaluation

Appendix Table E1. Risk of Bias for RCTs Evaluating Acupuncture compared with Sham, UC or WL for Chronic Migraine

	Acupuncture vs. Usual Care	Acupuncture vs. WL + UC	Acupuncture vs. Sham + UC
	Vickers 2004	Musil 2018	Habibabadi 2021
Study design			
Randomized controlled trial	✓	✓	✓
Methodological Principle			
Random sequence generation*	Yes	Yes	Yes
Statement of concealed allocation*	Yes	Yes	Unclear
Intention to treat*	No†	Yes	Yes
Independent or blind assessment	No‡	No‡	Yes
Co-interventions applied equally	Yes	Yes	Yes
Complete follow-up of ≥80%	No	Yes	Unclear§
<10% difference in follow-up between groups	Yes	Yes	Unclear§
Controlling for possible confounding**	Yes	Unclear††	Yes
Overall Risk of Bias	**Moderately High**	**Moderately Low**	**Moderately High**

*Applies to randomized controlled trials only.
†In the acupuncture and usual care group, respectively, 19 and 3 patients did not received treatment after randomization and are not accounted for in any analysis.
‡Outcomes were self-reported and patients could not be blinded due the nature of the treatments.
§ According to the authors, patients were also excluded from the study if they developed redness or infection at the site of the needle implant, used other analgesics during the study, or were unwilling to continue their cooperation in the present study. No information was provided regarding how many – if any – patients were excluded for these reasons.
**Authors must provide a description of robust baseline characteristics, and control for those that are unequally distributed between treatment groups.
††Mean duration of migraine years (27 vs. 23 years [median 28 vs. 20 years]) and smokers (21% vs. 11%) were somewhat different (though not statistically) between acupuncture and WL/UC groups, respectively; however, it is unclear if the difference is clinically significant.

Appendix Table E2. Risk of Bias for RCTs Evaluating Acupuncture compared with Pharmacologic Therapy or Botulinum Toxin A for Chronic Migraine

	Acupuncture vs. Topiramate	Acupuncture vs. Sodium valproate and vs. Botulinum Toxin A
	Yang 2011	Naderinabi 2017
Study design		
Randomized controlled trial	✓	✓
Methodological Principle		
Random sequence generation*	Yes	Unclear†
Statement of concealed allocation*	Unclear	Unclear†
Intention to treat*	Yes	Yes
Independent or blind assessment	No‡	No‡
Co-interventions applied equally	Yes	Yes
Complete follow-up of ≥80%	Yes	Yes§
<10% difference in follow-up between groups	Yes	Yes§
Controlling for possible confounding**	Yes	Yes (vs. sodium valproate) Unclear (vs. Botulinum toxin A)††
Overall Risk of Bias	**Moderately Low**	**Moderately High**

*Applies to randomized controlled trials only.
†Authors state they did blocked randomization ("designed quadripartite blocks") but there was no description of the strata chosen or the rationale for why they were chosen.
‡Outcomes were self-reported (patients kept a daily headache diary) and patients could not be blinded due the nature of the treatments.
§One of the exclusion criteria in this trial was "intolerable side effect occurrence"; however, authors state that the patients who dropped out did so because of low compliance but were not affected by severe adverse events.
**Authors must provide a description of robust baseline characteristics, and control for those that are unequally distributed between treatment groups.
††Mean number of days/month with headache (21 vs. 24) and mean number of drug use/month (15 vs. 18) were somewhat different between acupuncture and Botulinum toxin A groups, respectively; however, it is unclear if the difference is clinically significant.

Appendix Table E3. Risk of Bias for RCTs Evaluating Acupuncture in Chronic Tension-Type Headache

	Acupuncture vs. Sham		Acupuncture vs. Active Control*	
	Karst 2000	Tavola 1992	Carlsson 1990	Soderberg 2006, 2011
Study design				
Randomized controlled trial	✓	✓	✓	✓
Methodological Principle				
Random sequence generation†	Unclear	Unclear	Unclear	Unclear
Statement of concealed allocation†	Unclear	Unclear	Unclear	Unclear
Intention to treat†	Unclear	Unclear	Unclear	Yes
Independent or blind assessment	Yes	Yes	No‡	No‡
Co-interventions applied equally	Yes	Yes	Yes	Unclear
Complete follow-up of ≥80%	Unclear	Yes	Yes	12 wks.: Yes 26 wks.: No
<10% difference in follow-up between groups	Unclear	Yes	No§	Yes
Controlling for possible confounding**	No††	Yes	No‡‡	No§§
Risk of Bias	Moderately High	Moderately High	Moderately High	Moderately High

*Acupuncture was compared with physiotherapy (Carlsson 1990) and with both physical training and relaxation (Soderberg 2006, 2011; this trial had three arms).
†Applies to randomized controlled trials only.
‡Outcomes were self-reported (self-assessments and/or daily headache diary) and patients could not be blinded due the nature of the treatments: acupuncture vs. physiotherapy (Carlsson 1990) and vs. physical training and vs. relaxation (Soderberg 2006, 2011)
§20% difference between acupuncture (74%) and physiotherapy (94%) in the number of patients completing follow-up.
**Authors must provide a description of robust baseline characteristics, and control for those that are unequally distributed between treatment groups.
††Authors say that the groups did not differ in any baseline factors, however, the proportion of females in each group was disproportionate 38% vs. 61%.
‡‡The authors say that the social, demographic, and disease characteristics were similar between the treatment groups; however, they do not provide any detailed information for confirmation (they only present demographic data for the study population vs. a reference sample of "normal" patients).
§§The following difference were noted at baseline between groups and were not controlled for:

- Acupuncture vs. Physical Training: headache duration (median 10 years [range, 2-35] vs. 5 years [range, 2-30], respectively).
- Acupuncture vs. Relaxation, respectively: sex (77% vs. 90% female; authors report p=NS), age (median 35 vs. 44 years, p=0.002), and education (higher level, 80% vs. 27%; authors report p=NS).

APPENDIX F. Data Abstraction of Included Studies

Appendix Table F1. Study Characteristics and Patient Demographics for Acupuncture in Chronic Migraine

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U	Outcomes	Funding COI
Habibabadi 2021 Iran RCT 2019 to 2020	80	**Acupuncture (n=40)**: Auricular acupuncture with semi-permanent (ASP) ear needles. 20 effective migraine points specified according to reliable acupuncture references. A maximum of 4 ASP needles implanted in the most active points in each ear. Performed twice, 2 weeks apart. Practitioner was an anesthesiologist and pain medicine specialist with an auricular medicine certificate and 15 years of experience. **Sham acupuncture and usual care (n=40)**: A piece of adhesive tape was placed on	**Inclusion**: Migraine diagnosed by a neurologist according to the International Classification of Headache Disorders (ICHD-3), age 18-65 years **Exclusion**: Pregnant, severe coagulation disorders requiring anti-coagulant medications in which acupuncture may cause bleeding, advanced malignancies or underlying diseases, non-migraine headaches, history of drug or alcohol abuse or alcohol dependence, history of neurological or psychiatric illnesses, asthma or respiratory disorders, using analgesics for chronic pain for more than 3 days a month, prior auricular acupuncture, severe ear abnormalities, head or facial neuralgia, other neurological diseases, aura without headache, and migraine headache diagnosed after the age of 50 years.	*Acupuncture vs. Sham Acupuncture and Usual Care* Age, mean (SD): 37.1 (9.3) vs. 36.7 (8.9) years Female: 80% vs. 78% Duration of chronicity, mean (SD): 10.7 (8.0) vs. 10.5 (6.6) years Frequency of migraine, mean (SD): • migraine days/week: 3.37 (1.25) vs. 3.25 (1.06) • migraine headaches/week: 3.72 (2.19) vs. 4.00 (2.49) Duration of drug use: NR	1, 2, 3, and 4 weeks (% F/U unclear) Crossover: None	• Number of days per week with migraine • Number of migraine episodes per week • VAS pain severity • Patient satisfaction • Safety	Funding: NR COI: Authors report no COI

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U	Outcomes	Funding COI
		the inactive points of the ears. Patients received routine standard care (NOS) <u>Concomitant treatment (all patients)</u>: propranolol 20 mg every 12 hours; if VAS pain score >3, patient advised to take a Novafen capsule (acetaminophen 325 mg, caffeine 40 mg, and ibuprofen 200 mg) every 8 hours.	Authors also stated that the following were excluded: patients who developed redness or infection at the site of the needle implant, patients who used other analgesics during the study, and patients unwilling to continue their cooperation in the study.	Number of drug use/month: NR Concomitant medication overuse headache: NR History of receiving acupuncture: prior auricular acupuncture excluded			
Musil 2018 China RCT October 2015 to April 2017	86	**Acupuncture (n=42)**: TCM acupuncture; 4 mandatory and 16 optional points (locations determined according to the WHO standards of acupuncture nomenclature); limit 9–12 needles at each session in total. Needle diameter, 0.20 mm;	**Inclusion:** 18–70 years of age, history of migraine for ≥12 months, minimum of 4 days of migraine per 4 weeks and attending the neurology outpatient clinic at the University Hospital Hradec Kralove. All patients diagnosed with migraine with or without aura by board-certified neurologists according to the criteria of the ICHD. **Exclusion**:	*Acupuncture vs. Waitlist* Age, mean (SD): 45.6 (12.8) vs. 46.5 (10.3) years Female: 88% vs. 89% Duration of chronicity, mean: 26.9 (12.9) vs. 23.0 years (14.1)	12 (post-intervention) week (92% F/U rate) and 24 weeks (88% F/U rate) Crossover: None	• Responder rate* • Number of days per month with migraine† • Migraine attacks per month‡ • VAS intensity of migraine • Drug consumption • MIDAS	Funding: MH CZ-DRO (UHHK, 00179906) COI: None reported

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U	Outcomes	Funding COI
		length, 25 or 40 mm; and depth of insertion 10-30 mm. Manual manipulation until De Qi sensation. Needles left in for 25 minutes. 14 treatments over 12 weeks (2x/week in the first 4 weeks, 1/week during weeks 5–8 and once every 14 days during the last month). Practitioner was a specialized acupuncturist with a master's degree in acupuncture and 15 years of clinical practice in acupuncture. Concomitant treatment: prophylactic medications and analgesics as needed§ **Waitlist control (n=44):** Patients used standard	Pregnant; malignancy; experienced acupuncture treatment for the face, hands, legs or front part of the body in the past 6 months; history of head or neck injury; severe arrhythmia or heart failure, brain tumor, epilepsy and hemophilia; participated in another clinical trial in the past 6 months; unable to distinguish between migraine and tension-type headache; using anticoagulants or Chinese herbal medicines.	Frequency of migraine, mean (SD): 12.0 (6.6) vs. 12.1 (9.2) migraine days/month Duration of drug use, mean: NR Number of drug use/month, mean: NR Drug consumption - Anatomical Therapeutic Chemical Classification System/Defined Daily Doses, mean: 14.8 (14.3) vs. 11.5 (11.8) Concomitant medication overuse headache: NR History of receiving acupuncture: 0% (in past 6 months, exclusion criteria)		• Adverse events	

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U	Outcomes	Funding COI
		pharmacological treatments following the appropriate guidelines.					
Naderinabi 2017 Iran RCT March 2014 to February 2015	150	**Acupuncture (n=50):** TCM acupoints; 10–12 needles; gauge, 32; length, 25 and 40 mm; insertion depth 10-15 mm and often bilateral; manual manipulation, lifting, thrusting and rotating until deqi sensation; 30 sessions in 60 days (2 cycles, 1 week rest in between). Practitioner was a fixed experienced acupuncturist. **Botulinum toxin (n=50):** Botulinum toxin A (total dose 155 U) 31 fixed-site, fixed-dose, intramuscular injections across 7 specific head/neck muscle areas every	**Inclusion:** Chronic migraine diagnosed based on the criteria of the ICHD 3rd edition established by a neurologist, age 20-60 years, normal liver function and coagulation tests. **Exclusion:** Intolerable side effect occurrence, concomitant medication overuse headache and other types of headache based on the abovementioned diagnostic criteria, opioid abuse, recent use of prophylactic drugs (including ß blockers, sodium valproate, tricyclic antidepressants, topiramate, flunarizine and any other formulated prophylactic medications) in the last three months, other present or past neurologic disorders including epilepsy, multiple sclerosis, neuropathy and myopathy, myofascial pain syndrome established by history examination and/or documented paraclinical tests, past history of receiving	*Acupuncture vs. Botulinum toxin vs. Sodium valproate* Mean age (SD): 37.2 (7.3) vs. 36.8 (7.4) vs. 37.6 (7.4) years Female: 58% vs. 54% vs. 66% Duration of chronicity, mean (SD): 10.3 (5.5) vs. 9.2 (5.3) vs. 9.2 (4.0) years Frequency of migraine, mean (SD): 21.3 (6.8) vs. 23.6 (6.5) vs. 21.0 (4.4) days/month Duration of drug use, mean (SD): 4.2 (3.6) vs. 3.2 (3.2) vs. 4.1 (2.5) years	4, 8, and 12 weeks (93% F/U rate) Crossover: None	• Frequency headache days/months • VAS pain severity • Frequency of migraine medication use/month • Proportion of patients needing medication • Proportion of patients absent from work or social activities • Safety	Funding: Grant from the Research and Technology Vice-Chancellorship of Guilan University of Medical Sciences COI: Authors report no COI

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U	Outcomes	Funding COI
		12 weeks for 24 weeks (two cycles). **Pharmacological treatment (n=50):** sodium valproate 500 mg/day for 3 months <u>Concomitant treatment (all patients)</u>: Novafen (Alhavi Pharmaceutical Company) for acute migraine attacks	acupuncture and botulinum toxin A, pregnancy and lactation.	Number of drug use/month, mean (SD): 14.6 (5.6) vs. 17.8 (6.2) vs. 14.1 (5.1) Concomitant medication overuse headache: 0% (excluded) History of receiving acupuncture or botulinum toxin: 0% (excluded)			
Vickers 2004 UK Study period: Nov 1999-Nov 2001 RCT	401 random-ized 379 treated	**Acupuncture (n=161)** TCM acupuncture. Up to 12 treatments over 3 months. Acupoints individualized to each patient and at discretion of acupuncturist. No other details provided. Practitioner was an advanced member of the Acupuncture Association of Chartered Physiotherapist, had	**Inclusion criteria**: patients 18-65 years of age with migraine or tension-type headache (following IHS criteria) who reported average of at least 2 headaches per month **Exclusion criteria:** onset of headache disorder less than one year before or at age 50 or older, pregnancy, malignancy, cluster headache, suspicion that headache disorder had a specific etiology, cranial neuralgias, acupuncture treatment in the previous 12 months	*Acupuncture vs. Usual care* Age, mean (SD): 46.4 (10.0) vs. 46.2 (10.8) years Female: 83% vs. 86% Chronic tension-type headache: 6% vs. 6% Mean duration of chronicity (SD): 21.3 (14.5) vs. 21.9 (13.3) years	F/U (% Acupuncture, % Control): 3 mos. (75%, 75%), 12 mos. (75%, 75%) Crossover: None	• Proportion of patients with ≥ 50% improvement in Headache Frequency (reduction in days with headache) • Proportion of patients with ≥ 35% improvement Headache score • Mean headache days/month	Sponsor: NHS R&D National Coordinating Centre for Health Technology Assessment (NCCHTA) grant: 96/40/15 COI: One author (Nadia Ellis) provides acupuncture as part of her private physiotherapy practice

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U	Outcomes	Funding COI
		completed ≥250 hours of postgraduate training in acupuncture, had practiced acupuncture for a median of 12 years and treated a median of 22 patients per week. **Usual Care (n=140)** Usual care from general practitioner and were not referred to acupuncture.		Mean frequency of migraine: NR Mean frequency of headache (SD): 15.6 (6.6) vs. 16.2 (6.7) days in 28 days Patients having migraine with aura: NR Patients who had prior preventative treatments: NR Patients who overused medications: NR Scaled pain medication, weekly, mean (SD): 16.5 (18.1) vs. 14.3 (17.6) Scaled prophylactic medication, weekly, mean (SD): 9.0 (17.8) vs. 13.3 (22.2)		• Mean headache severity (0-10 VAS) • Proportion of patients who used any prophylactic medication in past month • SF-36 health status questionnaire • Adverse events (serious and nonserious, discontinuation due to adverse events)	
Yang 2011, 2013** Taiwan	66	**Acupuncture (n=33)** TCM, fixed and classic acupoints points. 7 total, 32	**Inclusion criteria**: Age 18-65 years, diagnosis based on the published guidelines of the Task Force of the International	Age, mean (SD): 47.6 (7.4) vs. 48.1 (6.4) years	1 week F/U: NR†	• Proportion of patients with ≥ 50% improvement	Sponsor: Taiwan Department of

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U	Outcomes	Funding COI
Study period: NR RCT		(Chinese) gauge, 0.25 x 40mm, sterile disposable steel needles inserted to standard depths. Manual manipulation until de qi sensation. Left in place for 30 minutes. Sessions 2x/week for 12 weeks. <u>Cointerventions:</u> None; no herbs, moxibustion, cupping, rehabilitation, advice regarding dietary or lifestyle modifications **Topiramate (n=33)** 4 week titration, beginning with 25mg/day increased by 25mg/day weekly to maximum 100mg/day followed by 8 week maintenance period.	Headache Society Clinical Trials Subcommittee for controlled trials of prophylactic treatment of chronic migraine in adults criteria A–C during the 3 months before trial entry, and an established migraine history for at least 1 year **Exclusion criteria:** Headache experienced ≥15 days per month or no response to triptans or ergots on at least 8 days during baseline period, headaches other than chronic migraine, migraine prophylaxis agents used in past 3 months, migraine onset after age 50 or over 60 years of age at onset of chronic migraine, history of hepatic disorder, nephrolithiasis or other severe illness, cognitive impairment interfering with instruction ability and symptom description, previous fear of acupuncture or acupuncture treatment in previous 3 months, bleeding diathesis or anticoagulation usage, pregnancy or nursing, and severe depression	Female: 91% vs. 88% Mean duration of chronicity: 13.2 (3.5) vs. 13.5 (4.5) years Mean frequency of migraine (SD): NR Frequency of headache, mean (SD): 21.3 (1.6) vs. 21.0 (1.4) days/month Frequency of moderate/severe headache, mean (SD): 20.2 (1.5) vs. 19.8 (1.7) days/month Patients having migraine with aura: NR Patients who had prior preventative treatments: NR Patients who overused medications: 73% vs. 76%	Crossover: None	in headache Frequency • Mean headache days per month • Migraine disability assessment (MIDAS) • Short Form 36 • Beck Depression Inventory-II • Hospital Anxiety and Depression Scale • Adverse events (serious and nonserious, death, discontinuation due to adverse events)	Health Clinical Trial and Research Center for Excellence, grant from Kuang Tien General Hospital COI: None stated

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U	Outcomes	Funding COI
		Concomitant treatment (all patients): acute headache medication as needed		Mean number of days with analgesic medication intake at baseline (SD): 15.1 (2.3) vs. 14.5 (2.6) units per month			

COI = conflict of interest; F/U = follow-up; ICHD = International Classification of Headache Disorder; mg = milligrams; mm = millimeters; NOS = not otherwise specified; NR = not reported; RCT = randomized control trial; TCM = Traditional Chinese Medicine.

* Response defined as ≥50% reduction in average monthly migraine day frequency .

† A migraine day was defined as a headache lasting for at least 30 minutes to 4 hours (believed by the subject to be a migraine that was relieved by medication) or >= 4 hours and had at least two of the following (unilateral location, pulsating quality, moderate or severe intensity and aggravation by or causing avoidance of routine physical activity).

‡ Distinct attacks were defined as attacks separated by an entire 24-hour period of freedom from headache as recommended by the guidelines for controlled trials of drugs in migraine.

§ e.g., beta blockers, tricyclic antidepressants, divalproex, topiramate, or in cases with insufficient effect monoamine oxidase inhibitors, flunarizine or gabapentin.

**Yang 2013 is a secondary analysis of the Yang 2011; it was included for KQ3 only addressing differential efficacy in subpopulations.

Appendix Table F2. Study Characteristics and Patient Demographics for Acupuncture in Chronic Tension-type Headache

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U %	Outcomes	Funding
Acupuncture vs. Sham							
Karst 2000 Germany Study period: NR Study period NR	39	**Acupuncture (n=21)** No. of treatments: Twice per week for 5 weeks Type of needle: Seirine B-type needle no. 8 (0.3 x 0.3 mm) and no. 3 (0.2 x 0.15 mm) Acupoints: GB 20, L 14, LR 3, GB 8, GB 14,	**Inclusion criteria**: CTTH according to IHS classification **Exclusion criteria:** Anticoagulation, predominantly operating factors, rebound analgesic	Age (SD): 49.0 (14.8) years Female: 48.7% Mean duration of chronicity: NR Mean frequency of headache (SD): 27.0 (6.5) days/month	F/U: last day of tx (NR), 6wks. (NR) Crossover: None	• Frequency of headache attacks (per month) • Headache severity (VAS 0-10) • Clinical global impression	Sponsor: NR COI: NR

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U %	Outcomes	Funding
		GB 21, GB 41, UB 2, UB 10, UB 60 No. of needles: Max of 15 No. of insertions per needle: NR Insertion depth: NR Time length of treatment: 30 min **Sham (n=18)** Blunt placebo needle simulated puncturing sensation without being inserted. Elastic foam was used to shield needle type **Cointervention** None	headache syndrome, symptomatic or other concomitant headaches, history of or current migraines	Patients who had prior preventative treatments: NR Patients who overused medications: NR Mean number of analgesic medications used at baseline: 9.2 (11.9) units per month		• Mean analgesic intake/month • Pressure pain threshold	
Tavola 1992 Italy Study period: NR RCT	30	**Acupuncture (n=15)** No. of treatments: 1 treatment per week for 8 weeks Type of needle: stainless steel, 0.3 mm diameter Acupoints: placements made according to traditional Chinese medicine criteria on an individual basis No. of needles: 6-10	**Inclusion Criteria:** Diagnosis of muscle-tensive and tension-type headache, exclusion of organic pathology, frequency of headache episodes greater than once a week having a mean intensity not less	Age (SD): 32.9 (11.6) years Female: 86.6% Mean duration of chronicity (SD): 7.8 (7.9) years Mean frequency of headache (SD): 17.5 (9.2) days/month	F/U: 6 mos., 12 mos.* Crossover: None	• Proportion of patients with >33% and >50% improvement over baseline on Headache Index • Headache frequency (no./month) • Headache intensity	Sponsor: NR COI: NR

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U %	Outcomes	Funding
		No. of insertions per needle: NR Insertion depth: 10-20mm Time length of treatment: 20 minutes **Sham (n=15)** No. of treatments: 1 treatment per week for 8 weeks No. of needles: 6-10 Acupoints: same regions, but not in specific acupoints Insertion depth: 2-4mm Time length of treatment: 20 minutes **Cointervention** None	than 'moderate,' abstainment from other therapies previously undertaken (except for non-narcotic analgesics). **Exclusion Criteria:** NR	Patients who had prior preventative treatments: NR Patients who overused medications: NR Mean number of analgesic medications used at baseline (SD): 11.5 (11.3) units/month		• Headache index (HI) • Frequency of analgesic use	
Acupuncture vs. Active Comparator							
Carlsson 1990 Sweden Study period: 1987—1988 RCT	60 rand, 58 treated	**Acupuncture (n=23)** No. of treatments: 4-5 Type of needle: NR Acupoints: classical Chinese acupuncture points (GB20, GB21, LI4) No. of needles: 3 No. of insertions per needle: NR	**Inclusion Criteria:** Females between 18-60 with duration of headache of more than 6 months, those who could speak and read Swedish	Age (SD): 34 (12) years % Female: 100% Mean duration of chronicity (SD): 9 (8) years Mean frequency of headache (SD): NR	F/U (% Acupuncture, % Physiotherapy): 12 mos. (74%, 93%) Crossover: None	• Sickness Impact Profile • Mood Adjective Check List • Intensity of headache (VAS 0-100), frequency	Sponsor: Swedish Fund for Scientific Research without Animal Experiments COI: NR

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U %	Outcomes	Funding
		Insertion depth: 10-30mm Time length of treatment: 20 min **Physiotherapy (n=29)** Specific for each patient including: relaxation techniques, auto-massage, cryotherapy and transcutaneous electrical nerve stimulation. No. of treatments: 1-2 sessions per week, 10-12 sessions over 2-3 months Time length of treatment: 30-45 minutes **Crossover** None	**Exclusion Criteria:** patients with malignant or other serious diseases, headaches with close temporal relation to an organic disorder or generalized myalgia, headaches as part of fibromyalgic syndrome	Patients who had prior preventative treatments: 96% Patients who overused medications: NR Mean number of analgesic medications used at baseline: NR		• Analgesic consumption • Adverse events	
Soderberg 2011 Sweden (multicenter) Study period: March	90	**Acupuncture (n=30)** No. of treatments: 10-12 sessions in 10-12 weeks Type of needle: 15 x 0.25mm and 30 or 40 x 0.30mm Acupoints: GB 20, GB 14, LI 14, and ST 44 (PC 6, PC 7, SP 6, GB	**Inclusion criteria**: 18 to 65 years old, CTTH according to IHS classification **Exclusion criteria:** Headache that began after age 50, > 1 migraine	Age (range): 37.5 (18-59) years Female: 81.1% Mean duration of chronicity (range): 7.5 (2-37) years Mean frequency of headache (SD): NR	F/U (% Acupuncture, % Physical Training, % Relaxation Training): 3 mos (90%, 86.7%, 86.7%), 6 mos (56.7%, 63.3%, 63.3%)	• Headache-free periods • Headache-free days • Headache intensity (VAS 0-100) • Minor Symptom	Sponsor: Vardalsstiftelsen Kommunala Landstingsforbundet for Landstinsangelagenheter, te Renee Eanders Fond, and GlaxoSmith Kline COI: NR

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U %	Outcomes	Funding
1997—Sept 1999 RCT		34, ST 8, EX 2, AMD EX 1 were optional) No. of needles: 10-12 No. of insertions per needle: 3 per session Insertion depth: 2-5 mm or 10-30 mm based on location Time length of treatment: 30 min **Physical Training (n=30)** 10 sessions done over 2.5-3 months. Sessions were a combination of in-clinic and home-training but all focused on neck and shoulder muscles **Relaxation Training (n=30)** 8-10 sessions performed individually with a physiotherapist. Combination of neuromuscular and self-hypnotic techniques, as well as breathing techniques, stress coping	per month in the past year, inability to speak or read Swedish, serious somatic or psychiatric disease, drug abuse of use of analgesics and triptans > 10 days per month	Patients who had prior preventative treatments: NR Patients who overused medications: NR Mean number of analgesic used at baseline: 9.2 (11.9) units per month	Crossover: None	Evaluation Profile	

Author, year Country Study design Study period	N	Interventions	Inclusion, Exclusion Criteria	Demographics	F/U %	Outcomes	Funding
		mechanisms, and how to relax during the day and during activity. **Cointervention** None					

COI, conflict of interest; CTTH, chronic tension-type headache; F/U, follow-up; IHS, International Headache Society; max, maximum; min, minutes; mm, millimeters; mos, months; NA, not applicable; No, number; NR, not reported; SD, standard deviation; Tx, treatment; wks, weeks
* Percent follow-up not reported.

Appendix Table F3. Efficacy Outcomes from RCTs Evaluating Acupuncture for Chronic Migraine

Author	Outcome	F/U post-treatment	Acupuncture	Comparator	Effect Estimate (95% CI)	p-value
			% (n/N) or Mean (SD)			
Acupuncture vs. Pharmacological Treatment						
Naderinabi 2017 Acupuncture vs. Sodium Valproate	VAS pain severity (0-10)	Baseline	8.6 (1.3)	8.4 (1.4)	MD 0.20 (–0.34 to 0.74)	0.46
		4 weeks	5.1 (NR)	5.9 (NR)	NC	NC
		8 weeks	3.7 (NR)	4.2 (NR)	NC	NC
		12 weeks	3.8 (NR)	5.0 (NR)	NC	NC
	Frequency; migraine days/month	Baseline	21.3 (6.8)	21.0 (4.4)	MD 0.30 (–1.97 to 2.6)	0.30
		4 weeks	10.8 (NR)	15.8 (NR)	NC	NC
		8 weeks	7.6 (NR)	13.4 (NR)	NC	NC
		12 weeks	8.0 (NR)	13.1 (NR)	NC	NC
	Frequency of migraine medication use/month	Baseline	14.6 (5.6)	14.1 (5.1)	MD 0.50 (–1.62 to 2.63)	0.64
		4 weeks	8.3 (4.5)	11.3 (5.4)	MD –3.0 (–4.97 to –1.03)	0.0032
		8 weeks	3.1 (3.7)	8.4 (5.4)	MD –5.3 (–7.14 to –3.47)	0.0001
		12 weeks	3.3 (4.0)	7.0 (4.3)	MD –3.7 (–5.35 to –2.05)	0.0001
	Proportion of patients needing medication	Baseline	100% (50/50)	100% (50/50)	RR 1.0	1.0
		4 weeks	56% (23/50)	66% (33/50)	RR 0.70 (0.48 to 1.0)	0.045
		8 weeks	18% (9/50)	52% (26/50)	RR 0.35 (0.18 to 0.66)	0.0004
		12 weeks	18% (9/50)	62% (31/50)	RR 0.29 (0.15 to 0.55)	<0.00001
	Proportion of patients absent from work or social activities	Baseline	96% (48/50)	90% (45/50)	RR 1.06 (0.96 to 1.19)	0.24
		4 weeks	38% (19/50)	42% (21/50)	RR 0.90 (0.56 to 1.46)	0.68
		8 weeks	10% (5/50)	14% (7/50)	RR 0.71 (0.24 to 2.1)	0.54
		12 weeks	10% (5/50)	18% (9/50)	RR 0.56 (0.50 to 1.5)	0.25
Yang 2011 Acupuncture vs. Topiramate 12 week treatment period	Responders (proportion of patients with ≥50% ↓ from baseline in number of moderate/severe headache days)	1 week	75.8% (25/33)	30.3% (10/33)	NR	<0.01
	Responders (proportion of patients with ≥50% ↓ from baseline in number of headache days)	1 week	63.6% (21/33)	15.2% (5/33)	NR	<0.01

Author	Outcome	F/U post-treatment	Acupuncture	Comparator	Effect Estimate (95% CI)	p-value
			% (n/N) or Mean (SD)			
	Δ from baseline, mean headache days/month	1 week	–10.7 ± 2.8 (n=33)	–7.9 ± 3.6 (n=33)	NR	<0.01
	Δ from baseline, mean moderate/severe headache days/month	1 week	–10.5 ± 2.8 (n=33)	–7.8 ± 3.6 (n=33)	NR	<0.01
	Δ from baseline, MIDAS score	1 week	–38.5 ± 10.7 (n=33)	–25.9 ± 9.3 (n=33)	NR	<0.01
	Δ from baseline, BDI-II score	1 week	–7.7 ± 4.8 (n=33)	–5.6 ± 2.4 (n=33)	NR	0.025
	Δ from baseline, HADS score	1 week	–7.1 ± 2.2 (n=33)	–2.9 ± 1.7 (n=33)	NR	<0.01
	Δ from baseline, mean days with acute headache med intake/month	1 week	–9.6 ± 3.3 (n=33)	–5.4 ± 4.7 (n=33)	NR	<0.01
	Δ from baseline, SF-36 physical function domain	1 week	18.7 ± 9.2 (n=33)	9.2 ± 4.9 (n=33)	NR	<0.01
	Δ from baseline, SF-36 role physical domain	1 week	27.6 ± 8.9 (n=33)	18.2 ± 9.3 (n=33)	NR	<0.01
	Δ from baseline, SF-36 bodily pain domain	1 week	13.7 ± 8 (n=33)	8.1 ± 4 (n=33)	NR	0.01
	Δ from baseline, SF-36 general health domain	1 week	22.3 ± 6.9 (n=33)	14.8 ± 11.9 (n=33)	NR	0.002
	Δ from baseline, SF-36 vitality domain	1 week	22.1 ± 6.6 (n=33)	16.8 ± 6.6 (n=33)	NR	0.002
	Δ from baseline, SF-36 social functioning domain	1 week	16 ± 8.1 (n=33)	9.8 ± 4.7 (n=33)	NR	<0.01
	Δ from baseline, SF-36 role emotion domain	1 week	27.8 ± 10.7 (n=33)	17.5 ± 6.2 (n=33)	NR	<0.01
	Δ from baseline, SF-36 mental health domain	1 week	22.2 ± 6.4 (n=33)	11 ± 6.5 (n=33)	NR	<0.01
Acupuncture vs. Botulinum Toxin-A						
Naderinabi 2017 (same study as vs. sodium valproate)	VAS pain severity (0-10)	Baseline	8.6 (1.3)	8.9 (1.2)	MD –0.30 (–0.80 to 0.20)	0.25
		4 weeks	5.1 (NR)	4.2 (NR)	NC	NC
		8 weeks	3.7 (NR)	4.2 (NR)	NC	NC
		12 weeks	3.8 (NR)	5.0 (NR)	NC	NC
	Frequency headache days/month	Baseline	21.3 (6.8)	23.6 (6.5)	MD –2.3 (–4.9 to 0.34)	0.09
		4 weeks	10.8 (NR)	11.8 (NR)	NC	NC

Author	Outcome	F/U post-treatment	Acupuncture	Comparator	Effect Estimate (95% CI)	p-value
			% (n/N) or Mean (SD)			
		8 weeks	7.6 (NR)	9.7 (NR)	NC	NC
		12 weeks	8.0 (NR)	13.1 (NR)	NC	NC
	Frequency of migraine medication use/month	Baseline	14.6 (5.6)	17.8 (6.2)	MD –3.2 (–5.5 to –0.86)	0.008
		4 weeks	8.3 (4.5)	9.2 (4.0)	MD –0.90 (–2.6 to 0.80)	0.29
		8 weeks	3.1 (3.7)	5.9 (3.8)	MD –2.8 (–4.3 to –1.3)	0.0003
		12 weeks	3.3 (4.0)	6.3 (3.3)	MD –3.0 (–4.5 to –1.5)	0.0001
	Proportion of patients needing medication	Baseline	100% (50/50)	100% (50/50)	RR 1.0	1.0
		4 weeks	56% (23/50)	42% (21/50)	RR 1.1 (0.70 to 1.7)	0.69
		8 weeks	18% (9/50)	32% (16/50)	RR 0.56 (0.27 to 1.15)	0.56
		12 weeks	18% (9/50)	80% (40/50)	RR 0.23 (0.12 to 0.41)	<0.00001
	Proportion of patients absent from work or social activities	Baseline	96% (48/50)	90% (45/50)	RR 1.07 (0.96 to 1.2)	0.24
		4 weeks	38% (19/50)	18% (9/50)	RR 2.1 (1.1 to 4.2)	0.03
		8 weeks	10% (5/50)	12% (6/50)	RR 0.83 (0.27 to 2.6)	0.75
		12 weeks	10% (5/50)	24% (12/50)	RR 0.42 (0.16 to 1.1)	0.07
Acupuncture vs. Sham, Waitlist, Usual Care						
Habibabadi 2021* Acupuncture vs. Sham + Usual care	VAS pain severity	Baseline	7.60 (7.81)	7.52 (2.11)	NR	0.865
		1 week	5.16 (3.26)	5.86 (2.46)	NR	0.294
		2 weeks	4.72 (2.53)	5.97 (2.68)	NR	0.038
		3 weeks	4.55 (2.49)	6.32 (2.55)	NR	0.003
		4 weeks	3.82 (2.68)	6.60 (2.59)	NR	<0.001
	Frequency; migraine days/week	Baseline	3.37 (1.25)	3.25 (1.06)	NR	0.631
		1 week	2.50 (0.82)	2.77 (0.73)	NR	0.117
		2 weeks	2.47 (0.93)	2.35 (0.83)	NR	0.529
		3 weeks	1.72 (0.64)	2.17 (0.75)	NR	0.006
		4 weeks	1.23 (0.77)	1.75 (0.59)	NR	0.001
	Frequency; migraine episodes/week	Baseline	3.72 (2.19)	4.00 (2.49)	NR	0.602
		1 week	2.69 (2.28)	3.36 (2.09)	NR	0.201
		2 weeks	2.13 (1.76)	3.54 (2.19)	NR	0.003
		3 weeks	2.40 (1.94)	3.81 (1.38)	NR	0.008
		4 weeks	2.39 (2.06)	3.92 (2.26)	NR	0.005
	Patient satisfaction with improvement of migraine symptoms (0–10 [complete satisfaction])	Timing NR	7.10 (2.69)	3.10 (2.75)	NR	<0.001

Author	Outcome	F/U post-treatment	Acupuncture	Comparator	Effect Estimate (95% CI)	p-value
			% (n/N) or Mean (SD)			
Musil 2018 Acupuncture vs. Waitlist + Usual care	Frequency; migraine days/month	Baseline	11.97 (6.6)	12.1 (9.2)	NR	NR
		Baseline to immediately post-intervention change	Median (IQR) –5.5 (–8.0 to –2.0)	Median (IQR) –2.0 (–5.0 to 0.5)	Difference –2.0 (95% CI –4.0 to –1.0)	<0.05
		Baseline to 24 week change	Median (IQR) –7.0 (–10 to –4.0)	Median (IQR) –4.0 (–7.0 to –1.0)	Difference –4 (95% CI –6.0 to –2.0)	<0.01
	Frequency; migraine attacks per month†	Baseline	6.4 (2.4)	6.0 (2.7)	NR	NR
		Baseline to immediately post-intervention change	−2.2 (2.6)	−0.7 (1.9)	Difference −1.47 (95% CI −2.5 to −0.45)	<0.01
		Baseline to 24 week change	−3.4 (2.2)	−2.1 (2.4)	Difference −1.36 (95% CI−2.4 to −0.31)	<0.05
	Headache intensity; VAS	Baseline	5.2 (1.3)	5.4 (1.8)	NR	NR
		Baseline to immediately post-intervention change	–0.18 (1.3)	0.3 (0.76)	Difference –0.48 (95% CI –0.96 to –0.001)	>0.05
		Baseline to 24 week change	0.18 (1.5)	0.13 (0.97)	Difference 0.05 (95% CI −0.55 to 0.65)	>0.05
	Responder rate (defined as a ≥50% reduction in average monthly migraine day frequency)	Immediately post-intervention	50% (19/38)	27% (11/41)	Difference 8% (95% CI NR)	<0.05
		24 weeks	81.8% (30/37)	35.9% (14/39)	Difference 16% (95% CI NR)	<0.05
	MIDAS	Baseline	48.9 (38.1)	52.9 (31.9)	NR	NR
		Baseline to immediately post-	−18.15 (23.3)	−10.7 (30.3)	−7.5 (95% CI −22.4 to 7.5)	>0.05

Author	Outcome	F/U post-treatment	Acupuncture	Comparator	Effect Estimate (95% CI)	p-value
			% (n/N) or Mean (SD)			
		intervention change				
		Baseline to 24 week change	−15.8 (25.6)	−6.2 (32.6)	−9.55 (−25 to 5.9)	>0.05
	Use of relief medication (Anatomical Therapeutic Chemical Classification System/defined daily doses [ATC/DDDs])	Baseline	14.8 (14.3)	11.5 (11.8)	NR	NR
		Baseline to immediately post-intervention change	Median (IQR) −3.2 (−10, −1)	Median (IQR) −1.2 (−4.7, 1.0)	Difference, −2.70 (95% CI −5.2 to −0.7)	<0.05
		Baseline to24 week change	Median (IQR) −5.7 (−11, −3)	Median (IQR) −2.7 (−7, 0.02)	Difference −3 (−5.8 to −0.7)	<0.05
Vickers 2004 12 week treatment period	≥35% improvement in headache score‡ (protocol definition)	Immediate	41% (65/159)	27% (37/136)	NA	0.014
		36 weeks	54% (87/161)	32% (45/140)	NA	0.0001
	≥50% improvement in headache days§ (IHS definition) – any	Immediate	23% (36/159)	13% (17/136)	NA	0.024
		36 weeks	30% (49/161)	15% (21/140)	NA	0.002
	≥50% improvement in headache days§ (IHS definition) – at least mild headache	36 weeks	35% (56/161)	18% (25/140)	NA	0.001
	≥50% improvement in headache days§ (IHS definition) – moderate or severe headache	36 weeks	39% (63/161)	26% (37/140)	NA	0.02
	Any prophylactic medication in past month	Baseline	25% (40/161)	32% (45/140)	NA	NR
		Immediate	21% (34/159)	29% (39/136)	Adjusted MD 7% (-3%, 17%)	0.15
		36 weeks	14% (22/161)	26% (37/140)	Adjusted MD 13% (4%, 22%)	0.005
	Headache score‡ (weekly)	Baseline	24.6 ± 14.1 (n=161)	26.7 ± 16.8 (n= 140)	NA	NR

Author	Outcome	F/U post-treatment	Acupuncture	Comparator	Effect Estimate (95% CI)	p-value
			% (n/N) or Mean (SD)			
		Immediate	18.0 ± 14.8 (n=159)	23.7 ± 16.8 (n=136)	Adjusted MD 3.9 (1.6, 6.3)	0.001
		36 weeks	16.2 ± 13.7 (n=161)	22.3 ± 17.0 (n=140)	Adjusted MD 4.6 (2.2, 7.0)	0.0002
	Headache days/month§ – any	Baseline	15.6 ± 6.6 (n=161)	16.2 ± 6.7 (n= 140)	NA	NR
		Immediate	12.1 ± 7.2 (n=159)	14.3 ± 7.3 (n=136)	Adjusted MD 1.8 (0.7, 2.9)	0.002
		36 weeks	11.4 ± 7.5 (n=161)	13.6 ± 7.5 (n=140)	Adjusted MD 1.8 (0.6, 2.9)	0.003
	Headache days/month§ – at least mild	Baseline	13.5 ± 6.3 (n=161)	13.8 ± 6.5 (n= 140)	NA	NR
		36 weeks	9.1 ± 6.5 (n=161)	10.9 ± 6.6 (n=140)	Adjusted MD 1.6 (0.5, 2.6)	0.004
	Headache days/month§ – moderate or severe	Baseline	8.5 ± 5.0 (n=161)	8.9 ± 5.7 (n= 140)	NA	NR
		36 weeks	5.4 ± 4.8 (n=161)	6.9 ± 5.6 (n=140)	Adjusted MD 1.2 (0.4, 2.1)	0.006
	Scaled pain medication (weekly)	Baseline	16.5 ± 18.1 (n=161)	14.3 ± 17.6 (n= 140)	NA	NR
		Immediate	11.0 ± 13.6 (n=159)	11.4 ± 14.1 (n=136)	Adjusted MD 1.6 (-0.7, 3.9)	0.16
		36 weeks	8.5 ± 12.2 (n=161)	18.7 ± 12.6 (n=140)	Adjusted MD 1.2 (-0.6, 3.1)	0.19
	Scaled prophylactic medication (weekly)	Baseline	9.0 ± 17.8 (n=161)	13.3 ± 22.2 (n= 140)	NA	NR
		Immediate	7.9 ± 17.6 (n=159)	11.5 ± 21.3 (n=136)	Adjusted MD 0.7 (-2.4, 3.8)	0.7
		36 weeks	5.0 ± 14.4 (n=161)	11.1 ± 21.3 (n=140)	Adjusted MD 3.9 (0.5, 7.4)	0.026
	Total scaled medication (weekly)	Baseline	25.4 ± 25.1 (n=161)	27.6 ± 28.8 (n= 140)	NA	NR
		Immediate	18.9 ± 21.7 (n=159)	22.9 ± 24.8 (n=136)	Adjusted MD 2.9 (-1, 6.7)	0.14

Author	Outcome	F/U post-treatment	Acupuncture	Comparator	Effect Estimate (95% CI)	p-value
			% (n/N) or Mean (SD)			
		36 weeks	13.4 ± 18.2 (n=161)	19.8 ± 24.4 (n=140)	Adjusted MD 5.2 (5.3, 9.2)	0.009
	SF-36 physical function subscale	Baseline	81.9 ± 21.1 (n=161)	85.3 ± 18.4 (n= 139)	NA	NR
		Immediate	82.6± 20.7 (n=156)	81.7 ± 21.3 (n=134)	Adjusted MD 3.0 (-2.0, 6.2)	0.07
		36 weeks	82.6 ± 23.3 (n=157)	82.3 ± 20.2 (n=138)	Adjusted MD 2.7 (-0.7, 6.0)	0.12
	SF-36 role functioning physical subscale	Baseline	60.4 ± 40.2 (n=161)	59.4 ± 38.6 (n= 139)	NA	NR
		Immediate	63.5 ± 14.4 (n=154)	56.7 ± 40.8 (n=134)	Adjusted MD 5.0 (-3.6, 3.5)	0.3
		36 weeks	70.0 ± 39.2 (n=157)	60.3 ± 41.3 (n=138)	Adjusted MD 8.8 (0.6, 17.0)	0.036
	SF-36 role functioning emotional subscale	Baseline	73.2 ± 36.6 (n=160)	69.6 ± 39.4 (n= 140)	NA	NR
		Immediate	72.4 ± 39.7 (n=155)	74.7 ± 36.3 (n=130)	Adjusted MD -5.1 (-13, 2.9)	0.2
		36 weeks	76.0 ± 37.0 (n=154)	70.1 ± 39.2 (n=136)	Adjusted MD 4.9 (-3.5, 13.4)	0.3
	SF-36 energy/fatigue subscale	Baseline	47.9 ± 19.9 (n=161)	52.2 ± 20.2 (n= 140)	NA	NR
		Immediate	51.3 ± 21.6 (n=154)	51.8 ± 20.8 (n=134)	Adjusted MD 1.9 (-1.8, 5.7)	0.3
		36 weeks	55.4± 20.7 (n=158)	54.2 ± 20.7 (n=139)	Adjusted MD 4.2 (0.6, 7.7)	0.02
	SF-36 emotional well-being subscale	Baseline	66.0 ± 15.0 (n=161)	67.0 ± 14.1 (n= 140)	NA	NR
		Immediate	66.6 ± 15.3 (n=156)	67.8 ± 14.0 (n=134)	Adjusted MD -0.9 (-3.8, 2.0)	0.5
		36 weeks	68.3 ± 15.4 (n=158)	68.9 ± 14.7 (n=139)	Adjusted MD 0.0 (-2.9, 2.9)	1.0
	SF-36 social functioning subscale	Baseline	71.0 ± 24.9 (n=161)	73.6 ± 21.6 (n= 140)	NA	NR

Author	Outcome	F/U post-treatment	Acupuncture	Comparator	Effect Estimate (95% CI)	p-value
			% (n/N) or Mean (SD)			
		Immediate	73.6 ± 24.8 (n=156)	75.4 ± 22.6 (n=134)	Adjusted MD -0.8 (-5.6, 4.1)	0.8
		36 weeks	77.9 ± 25.2 (n=158)	74.8 ± 23.2 (n=138)	Adjusted MD 4.2 (-0.8, 9.2)	0.1
	SF-36 pain subscale	Baseline	59.8 ± 23.3 (n=160)	66.3 ± 21.3 (n= 140)	NA	NR
		Immediate	64.3 ± 23.6 (n=156)	64.6 ± 23.5 (n=134)	Adjusted MD 2.4 (-2.5, 7.3)	0.3
		36 weeks	65.0 ± 24.5 (n=158)	63.7 ± 22.2 (n=139)	Adjusted MD 4.4 (-0.2, 9.0)	0.063
	SF-36 general health subscale	Baseline	60.2 ± 21.1 (n=161)	64.0 ± 21.8 (n= 140)	NA	NR
		Immediate	61.1 ± 21.1 (n=156)	61.8 ± 22.1 (n=134)	Adjusted MD 2.1 (95% CI -1.0, 5.3)	0.2
		36 weeks	61.9 ± 22.5 (n=158)	62.5 ± 22.9 (n=139)	Adjusted MD 3.0 (-0.4, 6.5)	0.09
	SF-36 health change subscale	Baseline	52.5 ± 15.4 (n=161)	53.4 ± 17.0 (n= 140)	NA	NR
		Immediate	58.0 ± 18.9 (n=154)	50.6 ± 18.3 (n=133)	Adjusted MD 7.7 (3.5, 12.0)	0.0004
		36 weeks	62.8 ± 20.1 (n=158)	55.5 ± 18.4 (n=139)	Adjusted MD 7.9 (3.5, 12.3)	0.0004
	Number of visits to GP	36 weeks	1.7 ± 2.5 (n=161)	2.3 ± 3.6 (n=140)	Adjusted incidence ratio 0.77 (0.56, 1.06)	0.1
	Number of visits to Specialist	36 weeks	0.22 ± 0.9 (n=161)	0.14 ± 0.6 (n=140)	Adjusted incidence ratio 1.13 (0.34, 3.73)	0.8
	Number of visits to Complementary therapist	36 weeks	2.0 ± 7.1 (n=161)	2.3 ± 6.8 (n=140)	Adjusted incidence ratio 0.56 (0.18, 1.72)	0.3
	Number of days off sick	36 weeks	12.6 (18.9) (n=161)	13.8 (16.2) (n=140)	Adjusted incidence ratio 0.84 (0.64 to 1.09)	0.2

CI = confidence interval; F/U = follow-up; MD = mean difference; NC = not calculable; NR = not reported; SD = standard deviation; VAS = visual analogue scale.

* All p-values for this study are adjusted for adjusting for sex, age, and use of Novafen (acetaminophen/caffeine/ibuprofen).

† Distinct attacks were defined as attacks separated by an entire 24-hour period of freedom from headache as recommended by the guidelines for controlled trials of drugs in migraine.

‡Severity of headaches were recorded 4x/day on a 6-point Likert scale and the total summed to give a headache score.

§"Days with headache" was defined very liberally as days on which a patient recorded headache severity of at least 1 out of 5 for at least one timepoint. The mean number of days with headache reported by this trial is accordingly larger than that seen in other trials. Therefore, the authors performed the analyses using more conservative definitions of days with headache (i.e., day on which mild or moderate/severe headache was reported); results indicated that differences between groups were not sensitive to the definition of headache day.

Appendix Table F4. Efficacy Outcomes from RCTs Evaluating Acupuncture for Chronic Tension-Type Headache

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
Acupuncture vs. Sham						
Karst 2000 5 week treatment period	VAS pain (mean) (0-10)	Baseline	6.2 ± 2.2 (n=21)	6.3 ± 2.2 (n=18)	NR	NR
		Immediate	4.3 ± 2.6 (n=21)	4.7 ± 2.4 (n=18)	NR	NR
		6 wks	4.0 ± 2.5 (n=21)	3.9 ± 2.7 (n=18)	NR	NR
	Clinical global impression (CGI) (-4 to 4)	Immediate	1.6 ± 1.5 (n=21)	0.8 ± 1.5 (n=18)	NR	NR
		6 wks	1.3 ± 1.4 (n=21)	1.1 ± 1.7 (n=18)	NR	NR
	Frequency of headache attacks/month	Baseline	26.9 ±7.0 (n=21)	27.2 ± 5.9 (n=18)	NR	NR
		Immediate	17.5 ± 12.6 (n=21)	22.8 ± 10.0 (n=18)	NR	NR
		6 wks	22.1 ± 10.6 (n=21)	22.0 ± 9.9 (n=18)	NR	NR
	PPT (Pressure Point Threshold) Left (kPa)	Baseline	329.1 ± 70.5 (n=21)	373.2 ± 28.6 (n=18)	NR	NR
		6 wks	360.0 ± 41.3 (n=21)	366.6 ± 57.1 (n=18)	NR	NR
	PPT (Pressure Point Threshold) Right (kPa)	Baseline	312.9 ± 78.8 (n=21)	354.7 ± 56.8(n=18)	NR	NR
		6 wks	368.2 ± 439.4 (n=21)	358.9 ± 76.6 (n=18)	NR	NR
	Analgesics/month	Baseline	8.3 ± 11.8 (n=21)	10.2 ± 12.0 (n=18)	NR	NR
		Immediately post-tx	6.4 ± 11.2 (n=21)	4.3 ± 5.7 (n=18)	NR	NR
		6 wks	13.7 ± 117.2 (n=21)	21.2 ± 27.6 (n=18)	NR	NR
Tavola 1992	Headache intensity (sum of the intensity of the headaches in a month [1 to 4; 1 = slight; 2 = medium: 3 = strong: 4 = very strong]/number of headaches)	Baseline	4.3 ± 3.9 (n=15)	4.5 ± 3.4 (n=15)	NR	NS

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
8 week treatment period	Headache frequency (no. of headaches/month)	Baseline	3.4 ± 2.4* (n=15) (estimated from graph)	3.2 ± 2.5* (n=15) (estimated from graph)	NR	NS
	Duration of headaches (sum of duration of headaches in hrs./no. of headaches)	Baseline	2.8 ± 1.8 * (n=15) (estimated from graph)	3.2 ± 2.6* (n=15) (estimated from graph)	NR	NS
	Headache index (intensity X duration X frequency/30)	Baseline	4.3 ± 3.9 (n=15)	4.5 ± 3.4 (n=15)	NR	NS
		Half-way thru tx (tx = 8 wks.)	3.4 ± 2.4* (n=15) (estimated from graph)	3.2 ± 2.5* (n=15) (estimated from graph)	NR	NS
		Immediately post-tx	2.8 ± 1.8 * (n=15) (estimated from graph)	3.2 ± 2.6* (n=15) (estimated from graph)	NR	NS
		4 wks	2.4 ± 1.4 * (n=15) (estimated from graph)	3.0 ± 2.3* (n=15) (estimated from graph)	NR	NS
		26 wks	2.2 ± 1.6* (n=15) (estimated from graph)	3.1 ± 2.6* (n=15) (estimated from graph)	NR	NS
		52 wks	3.2 ± 2.1* (n=15) (estimated from graph)	3.7 ± 2.2* (n=15) (estimated from graph)	NR	NS
	Analgesic consumption (sum of the drugs taken per month)	baseline (1 month prior to tx)	11.6 ± 10.2 (n=15)	11.5 ± 12.7 (n=15)	NR	NS
		half-way thru tx (tx = 8 wks.)	7.3 ± * (n=15) (estimated from graph)	9.8 ± * (n=15) (estimated from graph)	NR	NS

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
		Immediately post-tx	4.3 ± * (n=15) (estimated from graph)	9.3 ± * (n=15) (estimated from graph)	NR	NS
		4 wks	5.0 ± * (n=15) (estimated from graph)	9.0 ± * (n=15) (estimated from graph)	NR	NS
		26 wks	5.0 ± * (n=15) (estimated from graph)	8.5 ± * (n=15) (estimated from graph)	NR	NS
		52 wks	6.5 ± * (n=15) (estimated from graph)	9.5 ± * (n=15) (estimated from graph)	NR	NS
	Mean decrease of episode frequency from baseline to 9 wks.	4 wks	44.3%	21.4%	NR	NR
	Mean decrease of headache index from baseline to 9 wks.	4 wks	58.3%	27.8%	NR	NR
	Mean decrease of analgesic consumption from baseline to 9 wks.	4 wks	57.7%	21.7%	NR	NR
	Responders 33% threshold (Proportion of patients with >33% improvement over baseline on Headache Index)	4 wks	86.7% (13/15)	60.0% (9/15)	NR	P=0.125
	Responders 50% threshold (Proportion of patients with >50% improvement over baseline on Headache Index)	4 wks	53.3% (8/15)	46.7% (7/15)	NR	P=1
	Responders 33% threshold (Proportion of patients with >33% improvement over baseline on Headache Index)	52 wks	53.3% (8/15)	46.7% (7/15)	NR	P=1
	Responders 50% threshold (Proportion of patients with >50% improvement over baseline on Headache Index)	52 wks	40.0% (6/15)	26.7% (4/15)	NR	P=0.7

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
Acupuncture vs. Active Comparator						
Soderberg 2006 Acupuncture vs. physical training vs. relaxation training 10-12 week treatment period	Headache intensity (VAS 0-100)	Baseline	26.75 (range, 0.72–69.6) (n=30)	22.03 (range, 4.66–48.2) (n=30)	NR	NS
		Immediately post-tx	21.21 (range, 0.93–72.45) (n=30)	15.5 (range, 0.30–51.53) (n=30)	NR	NS
		12 wks	18.93 (range, 0.00–53.38) (n=30)	16.88 (range, 0.00–61.67) (n=30)	NR	NS
		24 wks	17.72 (range, 0.00–50.27) (n=30)	14.66 (range, 0.00–56.75) (n=30)	NR	NS
	Headache-free periods (0-28 periods/wk.)	Baseline	4.13 (range, 0.00–18.25) (n=30)	5.74 (range, 0.00–23.25) (n=30)	NR	NS
		Immediately post-tx	3.85 (range, 0.00–26.25) (n=30)	8.33 (range, 0.00–27.50) (n=30)	NR	NS
		12 wks	6.25 (range, 0.00–28.00) (n=30)	7.46 (range, 0.00–28.00) (n=30)	NR	NS
		24 wks	7.58 (range, 0.00–28.00) (n=30)	9.37 (range, 0.00–28.00) (n=30)	NR	NS
	Headache-free days (0-7 days/wk.)	Baseline	0.73 (range, 0.00–3.25) (n=30)	0.97 (range, 0.00–5.00) (n=30)	NR	NS
		Immediately post-tx	0.68 (range, 0.00–6.25) (n=30)	1.52 (range, 0.00–6.75) (n=30)	NR	P=0.01
		12 wks	1.18 (range, 0.00–7.00) (n=30)	1.23 (range, 0.00–7.00) (n=30)	NR	NS
		24 wks	1.56 (range, 0.00–7.00) (n=30)	1.66 (range, 0.00–7.00) (n=30)	NR	NS
	Headache intensity (VAS 0-100)	Baseline	26.75 (range, 0.72–69.6) (n=30)	26.14 (range, 3.77–61.71) (n=30)	NR	NS

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
		Immediately post-tx	21.21 (range, 0.93–72.45) (n=30)	16.77 (range, 0.00–56.24) (n=30)	NR	NS
		12 wks	18.93 (range, 0.00–53.38) (n=30)	16.14 (range, 0.00–66.64) (n=30)	NR	NS
		24 wks	17.72 (range, 0.00–50.27) (n=30)	15.08 (range, 0.00–70.48) (n=30)	NR	NS
	Headache-free periods (0-28 periods/wk.)	Baseline	4.13 (range, 0.00–18.25) (n=30)	3.32 (range, 0.00–19.50) (n=30)	NR	NS
		Immediately post-tx	3.85 (range, 0.00–26.25) (n=30)	6.98 (range, 0.00–28.00) (n=30)	NR	P=0.024
		12 wks	6.25 (range, 0.00–28.00) (n=30)	7.67 (range, 0.00–29.00) (n=30)	NR	NS
		24 wks	7.58 (range, 0.00–28.00) (n=30)	8.29 (range, 0.00–29.00) (n=30)	NR	NS
	Headache-free days (0-7 days/wk.)	Baseline	0.73 (range, 0.00–3.25) (n=30)	0.38 (range, 0.00–3.00) (n=30)	NR	NS
		Immediately post-tx	0.68 (range, 0.00–6.25) (n=30)	1.44 (range, 0.00–7.00) (n=30)	NR	P=0.01
		12 wks	1.18 (range, 0.00–7.00) (n=30)	1.58 (range, 0.00–7.25) (n=30)	NR	NS
		24 wks	1.56 (range, 0.00–7.00) (n=30)	1.73 (range, 0.00–7.25) (n=30)	NR	NS
Soderberg 2011 Acupuncture vs. physical training vs. relaxation training	Proportion of patients with Improved QoL (MSEP)	Immediately post-tx	56.7% (17/30)	63.3% (19/30)	NR	NS
		12 wks	56.7% (17/30)	86.7% (26/30)	NR	P=0.036
		24 wks	56.7% (17/30)	80.0% (24/30)	NR	NS
	Proportion of patients with Improved Vitality Dimension Score of ≥10 VAS units	Immediately post-tx	36.7% (11/30)	36.7% (11/30)	NR	NS
		12 wks	26.7% (8/30)	43.3% (13/30)	NR	NS
		24 wks	20.0% (6/30)	33.3% (10/30)	NR	NS

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
10-12 week treatment period	Proportion of patients with Improved Vitality Dimension Score (MSEP) of ≥25 VAS units	Immediately post-tx	16.7% (15/30)	16.7% (15/30)	NR	NS
		12 wks	16.7% (15/30)	16.7% (15/30)	NR	NS
		24 wks	10.0% (3/30)	13.3% (14/30)	NR	NS
	Proportion of patients with Improved Sleep QoL Dimension (MSEP) of ≥10 VAS units	Immediately post-tx	26.7% (8/30)	26.7% (8/30)	NR	NS
		12 wks	30.0% (9/30)	30.0% (9/30)	NR	NS
		24 wks	40.0% (12/30)	33.3% (10/30)	NR	NS
	Proportion of patients with Improved Sleep QoL Dimension (MSEP) of ≥25 VAS units	Immediately post-tx	13.3% (4/30)	23.3% (7/30)	NR	NR
		12 wks	10.0% (3/30)	13.3% (4/30)	NR	NR
		24 wks	13.3% (4/30)	16.7% (5/30)	NR	NR
	Proportion of patients with Improved Contentment Dimension Score (MSEP) of ≥10 VAS units	Immediately post-tx	43.3% (13/30)	26.7% (8/30)	NR	NS
		12 wks	30.0% (9/30)	30.0% (9/30)	NR	NS
		24 wks	40.0% (12/30)	33.3% (10/30)	NR	NS
	Proportion of patients with Improved Contentment Dimension Score (MSEP) of ≥25 VAS units	Immediately post-tx	10.0% (3/30)	13.3% (4/30)	NR	NS
		12 wks	10.0% (3/30)	13.3% (4/30)	NR	NS
		24 wks	13.3% (4/30)	16.7% (5/30)	NR	NS
	Proportion of patients with Improved QoL (MSEP)	Immediately post-tx	56.7% (17/30)	76.7% (23/30)	NR	NS
		12 wks	56.7% (17/30)	66.7% (20/30)	NR	NS
		24 wks	56.7% (17/30)	73.3% (22/30)	NR	NS
	Proportion of patients with Improved Vitality Dimension Score of ≥10 VAS units	Immediately post-tx	36.7% (11/30)	36.7% (11/30)	NR	NS
		12 wks	26.7% (8/30)	30.0% (9/30)	NR	NS
		24 wks	20.0% (6/30)	50.0% (15/30)	NR	P=0.04
	Proportion of patients with Improved Vitality Dimension Score (MSEP) of ≥25 VAS units	Immediately post-tx	16.7% (15/30)	10.0% (3/30)	NR	NS
		12 wks	16.7% (15/30)	10.0% (3/30)	NR	NS
		24 wks	10.0% (3/30)	33.3% (10/30)	NR	P=0.04
		Immediately post-tx	26.7% (8/30)	30.0% (9/30)	NR	NS
		12 wks	30.0% (9/30)	36.7% (11/30)	NR	NS

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
	Proportion of patients with Improved Sleep QoL Dimension (MSEP) of ≥10 VAS units	24 wks	40.0% (12/30)	53.3% (16/30)	NR	P=0.04
	Proportion of patients with Improved Sleep QoL Dimension (MSEP) of ≥25 VAS units	Immediately post-tx	13.3% (4/30)	16.7% (5/30)	NR	NS
		12 wks	10.0% (3/30)	16.7% (5/30)	NR	NS
		24 wks	13.3% (4/30)	26.7% (8/30)	NR	P=0.04
	Proportion of patients with Improved Contentment Dimension Score (MSEP) of ≥10 VAS units	Immediately post-tx	43.3% (13/30)	40.0% (12/30)	NR	NS
		12 wks	30.0% (9/30)	36.7% (11/30)	NR	NS
		24 wks	40.0% (12/30)	53.3% (16/30)	NR	NS
	Proportion of patients with Improved Contentment Dimension Score (MSEP) of ≥25 VAS units	Immediately post-tx	10.0% (3/30)	6.7% (2/30)	NR	NS
		12 wks	10.0% (3/30)	16.7% (5/30)	NR	NS
		24 wks	13.3% (4/30)	26.7% (8/30)	NR	NS
Carlsson 1990 (Health Status Acupuncture vs. physical training 8-12 week treatment period	Headache intensity (pain on VAS 0-100)	baseline (3-8 wks. before treatment)	41 (n=23) (estimated from graph)	52 (n=29) (estimated from graph)	NR	NR
		4-9 wks. after termination of tx	40 (n=23) (estimated from graph)	28 (n=29) (estimated from graph)	NR	NR
		After 7-12 mos. (?after termination of tx?)	52 (n=23) (estimated from graph)	29 (n=29) (estimated from graph)	NR	NR
	Sickness Impact Profile (SIP) - Overall (0-100, poorer health)	before tx	12.5 (n=23) (estimated from graph)	9.5 (n=29) (estimated from graph)	NR	NR
		after tx	9 (n=23) (estimated from graph)	4.5 (n=29) (estimated from graph)	NR	NR

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
	Sickness Impact Profile (SIP) - Psychosocial index (0-100, poorer health)	before tx	15.5 (n=23) (estimated from graph)	14 (n=29) (estimated from graph)	NR	NR
		after tx	10 (n=23) (estimated from graph)	4.5 (n=29) (estimated from graph)	NR	NR
	Sickness Impact Profile (SIP) - Emotional Behavior (0-100, poorer health)	before tx	26 (n=23) (estimated from graph)	23 (n=29) (estimated from graph)	NR	NR
		after tx	19 (n=23) (estimated from graph)	7 (n=29) (estimated from graph)	NR	NR
	Sickness Impact Profile (SIP) - Sleep and rest (0-100, poorer health)	before tx	23.5 (n=23) (estimated from graph)	17 (n=29) (estimated from graph)	NR	NR
		after tx	12.5 (n=23) (estimated from graph)	10.5 (n=29) (estimated from graph)	NR	NR
	Mood Adjective Check List (MACL) - Overall scores (1-4, more positive emotional state)	before tx	2.79 ± 0.37 (n=23)	2.77 ± 0.43 (n=29)	NR	NR
		after tx	2.77 ± 0.48 (n=23)	2.97 ± 0.48 (n=29)	NR	NR
	Mood Adjective Check List (MACL) - pleasantness/unpleasantness (1-4, more positive emotional state)	before tx	2.78 ± 0.50 (n=23)	2.82 ± 0.66 (n=29)	NR	NR
		after tx	2.72 ± 0.62 (n=23)	3.01 ± 0.64 (n=29)	NR	NR
	Mood Adjective Check List (MACL) - activation/deactivation (1-4, more positive emotional state)	before tx	2.86 ± 0.51 (n=23)	2.80 ± 0.56 (n=29)	NR	NR
		after tx	2.77 ± 0.67 (n=23)	3.04 ± 0.58 (n=29)	NR	NR
		before tx	2.29 ± 0.63 (n=23)	2.28 ± 0.61 (n=29)	NR	NR

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
	Mood Adjective Check List (MACL) - calmness/tension (1-4, more positive emotional state)	after tx	2.39 ± 0.68 (n=23)	2.60 ± 0.69 (n=29)	NR	NR
	Mood Adjective Check List (MACL) - extraversion/introversion (1-4, more positive emotional state)	before tx	2.80 ± 0.44 (n=23)	2.89 ± 0.41 (n=29)	NR	NR
		after tx	2.79 ± 0.50 (n=23)	3.03 ± 0.49 (n=29)	NR	NR
	Mood Adjective Check List (MACL) - pos/neg social orientation (1-4, more positive emotional state)	before tx	3.14 ± 0.46 (n=23)	3.10 ± 0.47 (n=29)	NR	NR
		after tx	3.07 ± 0.45 (n=23)	3.31 ± 0.47 (n=29)	NR	NR
	Mood Adjective Check List (MACL) - confidence/lack of confidence (1-4, more positive emotional state)	before tx	2.89 ± 0.52 (n=23)	2.74 ± 0.41 (n=29)	NR	NR
		after tx	2.87 ± 0.52 (n=23)	2.86 ± 0.49 (n=29)	NR	NR
	Headache frequency (1-to-5 scale: almost never, once or twice a month, once a week, several times a week and daily)	after tx			"reduced in both the groups p<0.001" (no data)	NR
Carlsson 1990 (Muscle Tenderness) Acupuncture vs. physical training 10-12 week treatment period	Headache intensity on a 5-point scale (1 none or negligible pain, 2 mild pain, 3 moderate pain, 4 severe pain and 5 incapacitating headache)	before tx	3.78 ± 0.96 (n=23)	3.72 ± 0.73 (n=29)	NR	NR
		after tx	3.24 ± 1.04 (n=23)	2.52 ± 0.80 (n=29)	NR	NR
	Proportion of patients NOT TAKING analgesics	before tx	5% (n=23) (estimated from graph)	3% (n=29) (estimated from graph)	NR	NR
		after tx	7% (n=23) (estimated from graph)	18% (n=29) (estimated from graph)	NR	NR

Author	Outcome	F/U post-treatment	Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
			Acupuncture	Comparator		
	Proportion of patients with a LOW intake of analgesics	before tx	4% (n=23) (estimated from graph)	11% (n=29) (estimated from graph)	NR	NR
		after tx	3% (n=23) (estimated from graph)	7% (n=29) (estimated from graph)	NR	NR
	Proportion of patients with a MODERATE intake of analgesics	before tx	11% (n=23) (estimated from graph)	13% (n=29) (estimated from graph)	NR	NR
		after tx	11% (n=23) (estimated from graph)	4% (n=29) (estimated from graph)	NR	NR
	Proportion of patients with a HIGH intake of analgesics	before tx	3% (n=23) (estimated from graph)	2% (n=29) (estimated from graph)	NR	NR
		after tx	2% (n=23) (estimated from graph)	0% (n=29) (estimated from graph)	NR	NR

Appendix Table F5. Safety Outcomes from RCTs Evaluating Acupuncture for Chronic Migraine and Chronic Tension-type Headache

			Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
Author	**Outcome**	**F/U post-tx**	**Acupuncture**	**Comparator**		
Chronic Migraine						
Yang 2011 Acupuncture vs. Topiramate	"Serious adverse events"	Immediate	0% (0/33)	0% (0/33)	NS	NR
	Death	Immediate	0% (0/33)	0% (0/33)	NS	NR
	Any non-serious adverse event (mostly mild and self-limiting)	Immediate	6% (2/33)†	66% (22/33)	NR	NR
	Paresthesia	Immediate	NR	48.4% (16/33)	NR	NR
	Difficulty with memory	Immediate	NR	36.3% (12/33)	NR	NR
	Dyspepsia	Immediate	NR	36.3% (12/33)	NR	NR
	Fatigue	Immediate	NR	24.2% (8/33)	NR	NR
	Dizziness	Immediate	NR	21.2% (7/33)	NR	NR
	Somnolence	Immediate	NR	18.1% (6/33)	NR	NR
	Nausea	Immediate	NR	12.1% (5/33)	NR	NR
	Adverse events leading to withdrawal from treatment	Immediate	0% (0/33)	9.1% (3/33)	NR	NR
Naderinabi 2017 Acupuncture vs. Sodium valproate	Any side effect	3 months	6% (3/50)‡	NR	NR	NR
	Asthenia	3 months	NR	10% (5/50)	NC	NC
	Anorexia	3 months	NR	4% (2/50)	NC	NC
	Weight gain	3 months	NR	4% (2/50)	NC	NC
	Tremor	3 months	NR	18% (9/50)	NC	NC
	Somnolence	3 months	NR	18% (9/50)	NC	NC
	Insomnia	3 months	NR	8% (4/50)	NC	NC
	Alopecia	3 months	NR	15% (7/50)	NC	NC
Naderinabi 2017 (same study as above, different control group; study had three arms) Acupuncture vs. Botulinum toxin A	Any side effect	3 months	6% (3/50)‡	22% (11/50)‡	RR 0.27 (0.09 to 0.92)	0.021
	Nausea and Vomiting	3 months	NR	NR – higher	NR	0.027
Habibabadi 2021	Ear swelling	Baseline	0% (0/40)	0% (0/40)	NR	NR

			Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
Author	**Outcome**	**F/U post-tx**	**Acupuncture**	**Comparator**		
Acupuncture vs. Sham + UC		1 week	10% (4/40)	0% (0/40)	NR	0.116
		2 weeks	2.5% (1/40)	0% (0/40)	NR	0.999
		3 weeks	10% (4/40)	0% (0/40)	NR	0.116
		1 month	5% (2/40)	0% (0/40)	NR	0.494
	Ear pain	Baseline	0% (0/40)	0% (0/40)	NR	NR
		1 week	7.5% (3/40)	0% (0/40)	NR	0.210
		2 weeks	17.5% (7/40)	0% (0/40)	NR	0.022
		3 weeks	15% (6/40)	0% (0/40)	NR	0.039
		1 month	5% (2/40)	0% (0/40)	NR	0.494
	Erythema§	1 month	0% (0/40)	0% (0/40)	NR	NR
	Hematoma§	1 month	0% (0/40)	0% (0/40)	NR	NR
	Ear infection§	1 month	0% (0/40)	0% (0/40)	NR	NR
Musil 2018 Acupuncture vs. Waitlist + UC	Facial hematoma**	3 months	1.3% (1/79)	NR	NR	NR
Vickers 2004 Acupuncture vs. UC 3 month treatment period	Headache (after acupuncture treatment)	Unclear	2.2% (4/186) (5 cases)	NR	NR	NR
	Withdrawal at 3 months due to adverse effects (NOS) (unclear if this patient is included in the count above)	12 wks.	0.6% (1/173)	0% (0/140)	NR	NR
	No serious adverse events (assumed based on statement "Confirming the excellent safety profile of acupuncture, the only adverse event reported was five cases of headache after treatment in four subjects.")	36 wks.	0% (0/186)	0% (0/193)	NR	NR
Chronic Tension-Type Headache						
Carlsson 1990 Acupuncture vs. Physiotherapy	"In a few patients, a slight vasovagal reaction was seen at the first treatment [in the acupuncture group]. Otherwise, no complications were noted."					
Karst 2000	NR					

			Results (mean ± SD or % (n/N))		Effect Estimate (95% CI)*	p-value*
Author	**Outcome**	**F/U post-tx**	**Acupuncture**	**Comparator**		
Soderberg 2006	NR					
Tavola 1992	NR					

CI, confidence interval; NOS, not otherwise stated; NR, not reported; NS, not statistically significant; SD, standard deviation; SMT, spinal manipulation therapy; tx, treatment; U, units; UC, usual care; wks., weeks;

*As reported by authors.

†Non-serious adverse events/side effects, primarily related to local insertion of needles, i.e., local pain after treatment, ecchymosis, local paresthesia during treatment

‡For Acupuncture group, includes only bleeding or subcutaneous hematoma; for Botulinum toxin A group, includes ptosis, facial masking or asymmetry.

§The authors state that patients were excluded from the study if they developed redness or infection at the site of the needle implant, so these results should be interpreted with extreme caution.

**Mild and common adverse event, resolved within 2 days without medication or medical help.

APPENDIX G. List of on-going studies and study protocols

Appendix Table G1. List of study protocols excluded at full text review that appear to meet inclusion criteria

Studies	Population	Status
RCTs		
Lu L, Zheng H, Zheng Q, et al. The long-term effect of acupuncture for patients with chronic tension-type headache: study protocol for a randomized controlled trial. Trials. 2017 Oct 3;18(1):453. doi: 10.1186/s13063-017-2188-9. PMID: 28974247. Trial ID: NCT03133884.	Chronic tension-type headache	Recruiting: Completed No published results to date
Liu L, Zhao LP, Zhang CS, et al. Acupuncture as prophylaxis for chronic migraine: a protocol for a single-blinded, double-dummy randomised controlled trial. BMJ open. 2018;8(5)doi: 10.1136/bmjopen-2017-020653. PMID: CN-01644459. Trial registration number ISRCTN13563102; Pre-results.	Chronic migraine	Unclear
Dong Y, Guo T, Xu L, et al. Cervicogenic headache treated by acupuncture based on jin theory: study protocol for a randomized controlled trial. Trials 2019;20:418. Trial registration: , AMCTR-IOR-18000157	Cervicogenic headache (unclear if target population is chronic from protocol)	Unclear

N/A = not applicable.

APPENDIX H. Clinical Expert Peer Review

Diane L. Behall, D.A.O.M., L.Ac.
Assistant Professor
Anesthesiology and Perioperative Medicine
Comprehensive Pain Center
Oregon Health and Science University
Portland, OR

Natalie Murinova, M.D., M.H.A.
Neurology
Headache Clinic at UW Medical Center
University of Washington
Seattle, WA

Mark D. Sodders, D.A.O.M.
Postdoctoral Scholar
Harborview Injury Prevention & Research Center
University of Washington School of Medicine
Seattle, WA

APPENDIX REFERENCES

1. Methods Guide for Effectiveness and Comparative Effectiveness Reviews. AHRQ Publication No. 10(14)-EHC063-EF. Rockville, MD: Agency for Healthcare Research and Quality. January 2014. Chapters available at: www.effectivehealthcare.ahrq.gov.
2. Guyatt G, Oxman AD, Akl EA, et al. GRADE guidelines: 1. Introduction—GRADE evidence profiles and summary of findings tables. Journal of clinical epidemiology 2011;64:383-94.
3. Ofman JJ, Sullivan SD, Neumann PJ, et al. Examining the value and quality of health economic analyses: implications of utilizing the QHES. Journal of Managed Care Pharmacy 2003;9:53-61.
4. Oxman AD, Guyatt GH. A consumer's guide to subgroup analyses. Annals of internal medicine 1992;116:78-84.