Table des matières

1. Systematic Reviews and Meta-Analysis 1
1.1. Generic acupuncture 1
1.1.1. Li 2025 (combined with hyperbaric oxygenation) 1
1.1.2. Tan 2019 2
1.1.3. Wong 2013 Ø 2
1.1.4. Wong 2012 Ø 3
1.1.5. Wong 2011 Ø 4
1.2. Related symptoms 5
1.2.1. Insomnia following brain injury 5
1.2.2. Cognitive impairment in patients with traumatic brain injury 5
1.2.2.1. Li 2026 5
2. Overviews of systematic reviews 5
2.1. Yang 2026 5
3. Clinical Practice Guidelines 6
3.1. Spanish Society of Neurorehabilitation (SSN, Spain) 2025 ⊕ 6
3.2. Department of Veterans Affairs Department of Defense (VA/DoD, USA) 2021 Ø 7
3.3. Ontario Neurotrauma Foundation (ONF, Canada) 2014 ⊕ 7
3.4. Colorado Division of Workers' Compensation (DOWC, USA) 2013 ⊕ 7

Traumatic Brain Injury

Traumatismes crâniens : évaluation de l'acupuncture

1. Systematic Reviews and Meta-Analysis

1.1. Generic acupuncture

1.1.1. Li 2025 (combined with hyperbaric oxygenation)

Li G, Wang B, Fan S, Liu S, Shao L, Li C, Fang Y, Li J, Qiu M, Zhang Y, Pan L. The effect of acupuncture combined with hyperbaric oxygenation compared with hyperbaric oxygenation alone for patients with traumatic brain injury: a systematic review and meta-analysis. Front Neurol. 2025 May 2;16:1538740. https://doi.org/10.3389/fneur.2025.1538740

Background	This study aimed to evaluate the effects of acupuncture combined with hyperbaric oxygenation (HBO) compared with HBO alone in improving the disturbance of consciousness (DOC) of people with traumatic brain injury (TBI).
Methods	The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed in this study. In accordance with the preestablished search strategy, all the literature was obtained from eight online databases. Following the stringent application of inclusion and exclusion criteria, two researchers conducted an independent extraction of valid data from eligible randomized controlled trials (RCTs). The risk of bias in each study was assessed using the Cochrane Risk of Bias 2.0 tool. The meta-analysis was conducted utilizing the RevMan software. Adverse events were determined based on data from each study assessing the safety of acupuncture treatment.
Results	A total of **11 RCTs with 896 participants** were included in the analysis. Overall, the methodological quality of the RCTs encompassed within this meta-analysis was below standard. The pooled data demonstrated that acupuncture treatment combined with HBO was significantly superior to HBO alone, based on the Glasgow Coma Scale (GCS) scores [mean difference (MD) = 2.13, 95% confidence interval (CI): 1.64-2.62, $p < 0.00001$]. We also found that electroacupuncture (EA) combined with HBO improved GCS scores more than HBO alone in TBI patients (MD = 2.15, 95% CI: 1.95-2.36). The early intervention (MD = 3.09, 95% CI, 2.66-3.52) demonstrated significantly more significant improvement in GCS scores following combination therapy compared with the late intervention group (MD = 1.86, 95% CI, 1.47-2.25). Furthermore, compared with HBO alone, acupuncture combined with HBO significantly improved patients' consciousness rate (CR) (RR = 2.26, 95% CI: 1.48-3.46). Statistical analysis also revealed that acupuncture combined with HBO improved the effective rate (ER) (RR = 1.47, 95% CI: 1.27-2.69). Additionally, no studies reported any significant adverse events.

Conclusion	Compared with HBO alone, acupuncture combined with HBO has a more substantial positive effect on GCS scores, AR, and ER in patients with TBI. However, given the limited availability of high-quality evidence and the dearth of RCTs in this area, the conclusions drawn herein warrant validation through additional research endeavours.

1.1.2. Tan 2019

Tan L, Zeng L, Wang N, Deng M, Chen Y, Ma T, Zhang L, Xu Z. Acupuncture to Promote Recovery of Disorder of Consciousness after Traumatic Brain Injury: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2019 Mar 19;2019:5190515. https://doi.org/10.1155/2019/5190515

Obejctive	Traumatic brain injury (TBI) has become an economic and social burden for patients and their families. While acupuncture is an effective tool for promoting recovery of disorder of consciousness (DOC) following TBI, there have been no comprehensive meta-analyses and/or systematic reviews addressing this topic. The present systematic review and meta-analysis aimed to assess the therapeutic efficacy of acupuncture for DOC after TBI.
Methods	All randomized controlled trials (RCTs) incorporating acupuncture, or acupuncture combined with other interventions for DOC after TBI, were included and assessed by two independent investigators. Six outcome indicators were assessed: Glasgow Coma Scale (GCS); Glasgow Outcome Scale (GOS); mortality; efficacy rate; activities of daily living (ADL); and functional comprehensive assessment. Direct comparisons were performed using RevMan 5.3.0 software, with results presented as mean difference (MD) for continuous outcomes and relative risk (RR) for binary outcomes.
Results	A total of **3511 patients from 49 trials** were included. Pooled analyses indicated that acupuncture may have a superior effect on GCS score (MD=2.03, 95% CI :1.92 2.43, Z=16.54, and P<0.00001); GOS score (RR=1.23, 95%CI: 1.18 1.35, Z=6.65, and P<0.00001); efficacy rate (RR=1.48, 95%CI: 1.40 1.56, Z=13.49, and P<0.00001); ADL (MD=9.20, 95% CI:8.19 10.21, Z=17.84, and P<0.00001); and mortality (RR=0.50, 95% CI:0.38 0.67, Z=4.70, and P<0.00001).
Conclusions	The results demonstrated that the acupuncture group fared better than the control group in the treatment of DOC after TBI. However, studies were generally of poor quality, and publication bias favoring positive studies was obvious. Therefore, rigorous evaluation standards and well-designed studies are necessary in future studies.

1.1.3. Wong 2013 Ø

Wong V, Cheuk DK, Lee S, Chu V. Acupuncture for acute management and rehabilitation of traumatic brain injury. Cochrane Database Syst Rev 2013. [156501].

Background	Traumatic brain injury (TBI) can be life threatening depending on the severity of the insult to the brain. It can also cause a range of debilitating sequelae which require cognitive, motor, communication, emotional, or behavioral rehabilitation of varying intensity and duration. A number of studies conducted and published in China have suggested that acupuncture may be beneficial in the acute treatment and rehabilitation of TBI.
Objectives	To determine the efficacy and safety of acupuncture in the acute management or rehabilitation (or both) of patients with a TBI, including cognitive, neurological, motor, communication, emotional, or behavioral complications, or a combination of such complications.

Methods	Search strategy: We searched the Cochrane Injuries Group Specialised Register, Cochrane Central Register of Controlled Trials 2008, Issue 2 (The Cochrane Library), MEDLINE, EMBASE, CINAHL, AMED, PsycINFO and others. We also searched the Chinese Acupuncture Studies Register, the Studies Register of the Cochrane Complementary Medicine Field, NCCAM, and NIH Clinical Studies Database. Three major Mainland Chinese academic literature databases (CNKI, VIP and Wang Fang Data) were also searched using keywords in simplified Chinese. Searches were completed in December 2009. selection criteria: randomized controlled studies evaluating different variants of acupuncture and involving participants of any age who had suffered a TBI. Included trials compared acupuncture with placebo or sham treatment, or acupuncture plus other treatments compared with the same other treatments. We excluded trials that only compared different variants of acupuncture or compared acupuncture alone against other treatments alone, as they did not yield the net effect of acupuncture. Data collection and analysis: Two review authors identified potential articles from the literature search and extracted data independently using a data extraction form. We performed methodological assessment of included studies using the Cochrane Collaboration's tool for assessing risk of bias. We were unable to perform quantitative data analysis due to insufficient included studies and available data.
Main results	Four RCTs, including 294 participants, reported outcomes specified by this review. Three investigated electro-acupuncture for TBI while one investigated acupuncture for acute TBI. The results seem to suggest that acupuncture is efficacious for these indications, however the low methodological quality of these studies renders the results questionable. No adverse effects of acupuncture were reported in any of the studies.
Authors' conclusion	The low methodological quality of the included studies does not allow us to make conclusive judgments on the efficacy and safety of acupuncture in either the acute treatment and/or rehabilitation of TBI. Its beneficial role for these indications remains uncertain. Further research with high quality trials is required.

1.1.4. Wong 2012 Ø

Wong V, Cheuk DK, Lee S, Chu V. Acupuncture for acute management and rehabilitation of traumatic brain injury. Cochrane Database Syst Rev 2012;CD007700. [168830]

[Update of Cochrane Database Syst Rev 2011 (gera:141366)]. BACKGROUND: Traumatic brain injury (TBI) can be life threatening depending on the severity of the insult to the brain. It can also cause a range of debilitating sequelae which require cognitive, motor, communication, emotional, or behavioral rehabilitation of varying intensity and duration. A number of studies conducted and published in China have suggested that acupuncture may be beneficial in the acute treatment and rehabilitation of TBI. OBJECTIVES: To determine the efficacy and safety of acupuncture in the acute management or rehabilitation (or both) of patients with a TBI, including cognitive, neurological, motor, communication, emotional, or behavioral complications, or a combination of such complications. SEARCH METHODS: We searched the Cochrane Injuries Group Specialised Register, Cochrane Central Register of Controlled Trials (The Cochrane Library),MEDLINE, EMBASE, CINAHL, AMED, PsycINFO and others. We also searched the Chinese Acupuncture Studies Register, the Studies Register of the Cochrane Complementary Medicine Field, NCCAM, and NIH Clinical Studies Database.Three major Mainland Chinese academic literature databases (CNKI, VIP and Wang Fang Data) were also searched using keywords in simplified Chinese.We searched all databases through December 2009, and some searches have been updated to October 2012. SELECTION CRITERIA: Randomized controlled studies evaluating different variants of acupuncture and involving participants of any age who had suffered a TBI. Included trials compared acupuncture with placebo or sham treatment, or acupuncture plus other treatments compared with the same other treatments.We excluded trials that only compared different variants of acupuncture or compared acupuncture alone against other treatments alone, as they did not yield the net effect of acupuncture. DATA COLLECTION AND ANALYSIS: Two review authors identified potential articles from the literature search and extracted data independently using a data extraction form. We performed methodological assessment of included studies using the Cochrane

Collaboration's tool for assessing risk of bias.We were unable to perform quantitative data analysis due to insufficient included studies and available data. MAIN RESULTS: Four RCTs, including 294 participants, reported outcomes specified by this review. Three investigated electro-acupuncture for TBI while one investigated acupuncture for acute TBI. The results seem to suggest that acupuncture is efficacious for these indications,however the low methodological quality of these studies renders the results questionable. No adverse effects of acupuncture were reported in any of the studies. AUTHORS' CONCLUSIONS: The low methodological quality of the included studies does not allow us to make conclusive judgments on the efficacy and safety of acupuncture in either the acute treatment and/or rehabilitation of TBI. Its beneficial role for these indications remains uncertain.Further research with high quality trials is required.

1.1.5. Wong 2011 Ø

Wong V, Cheuk DK, Lee S, Chu V. Acupuncture for acute management and rehabilitation of traumatic brain injury. Cochrane Database Syst Rev. 2011;CD007700: . [141366]. Republié dans : Eur J Phys Rehabil Med. 2012;48(1):71-86. [165985].

Background	Traumatic brain injury (TBI) can be life threatening depending on the severity of the insult to the brain. It can also cause a range of debilitating sequelae which require cognitive, motor, communication, emotional, or behavioral rehabilitation of varying intensity and duration. A number of studies conducted and published in China have suggested that acupuncture may be beneficial in the acute treatment and rehabilitation of TBI.
Objectives	To determine the efficacy and safety of acupuncture in the acute management or rehabilitation (or both) of patients with a TBI, including cognitive, neurological, motor, communication, emotional, or behavioral complications, or a combination of such complications.
Methods	SEARCH STRATEGY: We searched the Cochrane Injuries Group Specialised Register, Cochrane Central Register of Controlled Trials 2008, Issue 2 (The Cochrane Library), MEDLINE, EMBASE, CINAHL, AMED, PsycINFO and others. We also searched the Chinese Acupuncture Studies Register, the Studies Register of the Cochrane Complementary Medicine Field, NCCAM, and NIH Clinical Studies Database. Three major Mainland Chinese academic literature databases (CNKI, VIP and Wang Fang Data) were also searched using keywords in simplified Chinese. Searches were completed in December 2009. SELECTION CRITERIA: Randomized controlled studies evaluating different variants of acupuncture and involving participants of any age who had suffered a TBI. Included trials compared acupuncture with placebo or sham treatment, or acupuncture plus other treatments compared with the same other treatments. We excluded trials that only compared different variants of acupuncture or compared acupuncture alone against other treatments alone, as they did not yield the net effect of acupuncture. DATA COLLECTION AND ANALYSIS: Two review authors identified potential articles from the literature search and extracted data independently using a data extraction form. We performed methodological assessment of included studies using the Cochrane Collaboration's tool for assessing risk of bias. We were unable to perform quantitative data analysis due to insufficient included studies and available data.
Main results	Four RCTs, including 294 participants, reported outcomes specified by this review. Three investigated electro-acupuncture for TBI while one investigated acupuncture for acute TBI. The results seem to suggest that acupuncture is efficacious for these indications, however the low methodological quality of these studies renders the results questionable. No adverse effects of acupuncture were reported in any of the studies.

Authors' conclusions	The low methodological quality of the included studies does not allow us to make conclusive judgments on the efficacy and safety of acupuncture in either the acute treatment and/or rehabilitation of TBI. Its beneficial role for these indications remains uncertain. Further research with high quality trials is required.

1.2. Related symptoms

1.2.1. Insomnia following brain injury

see correponding item

1.2.2. Cognitive impairment in patients with traumatic brain injury

1.2.2.1. Li 2026

Li H, Li J, Weng Z, Gao L, Xu C, Zhang C, Wu Y, Wen C, Xie K, Liu T. Efficacy of non-pharmacological interventions for cognitive impairment in patients with traumatic brain injury: a network meta-analysis. Front Neurol. 2026;17:1813941. doi: 10.3389/fneur.2026.1813941.

Background	Non-pharmacological interventions may improve cognitive function in patients with traumatic brain injury (TBI); however, their comparative effectiveness and clinical prioritization remain unclear. This study aimed to evaluate multiple non-pharmacological interventions using a network meta-analysis and to assess the certainty of evidence while identifying existing research gaps.
Methods	Randomized controlled trials (RCTs) were systematically searched in English and Chinese databases up to August 15, 2025. Two reviewers independently performed study selection, data extraction, and risk of bias assessment using the Cochrane Risk of Bias Tool (RoB 1.0). A network meta-analysis was conducted using R to compare intervention effects on Mini-Mental State Examination (MMSE), Montreal Cognitive Assessment (MoCA), and Modified Barthel Index (MBI). Evidence quality was assessed using the GRADE framework.
Results	**Nine RCTs involving 528 participants** and eight non-pharmacological interventions were included. The evidence network was sparse, with most comparisons informed by single studies. Music therapy showed a potential benefit in improving MMSE scores. Comprehensive nursing intervention demonstrated a possible advantage in MoCA outcomes. **Electroacupuncture** combined with hyperbaric oxygen therapy showed a positive trend in improving MBI scores. However, effect estimates were imprecise, and overall evidence certainty was low or very low.
Conclusion	Current evidence suggests that several non-pharmacological interventions may offer potential benefits for cognitive and functional recovery in TBI patients; however, findings are highly uncertain and insufficient to support clinical prioritization. This study highlights important evidence gaps, and further large-scale, high-quality RCTs are needed to establish reliable comparative effectiveness.

2. Overviews of systematic reviews

2.1. Yang 2026

Yang X, Li Y, Zhang N, Luo D, Zhao C, Liu Q. Efficacy and safety of neuromodulation and multimodal

therapies for traumatic brain injury-induced disorders of consciousness: an updated umbrella review. Front Neurol. 2026 Mar 4;17:1742096. https://doi.org/10.3389/fneur.2026.1742096

Background	Post-traumatic disorders of consciousness (DoC) remain a major barrier to recovery after traumatic brain injury (TBI), yet therapeutic guidance is fragmented across modalities.
Objective	To synthesize the highest-level evidence on efficacy and safety of interventions for TBI-related DoC and derive practice-oriented recommendations.
Methods	Following PRISMA and a prospectively registered protocol (INPLASY202480015), we systematically screened PubMed, Embase, Web of Science, and CNKI through June 2024 for peer-reviewed systematic reviews and meta-analyses focused on TBI-induced DoC. Methodological quality was appraised using AMSTAR-2. Primary outcomes were CRS-R, GCS, GOS, and overall efficacy rate; random- or fixed-effects models were applied per heterogeneity.
Results	**Seven high-quality evidence syntheses encompassing 121 trials and eight interventions were included**. Neuromodulation showed consistent benefits: repetitive transcranial magnetic stimulation (rTMS) improved CRS-R (MD 3.00, 95% CI 2.47-3.52) and GCS (MD 2.92, 1.65-4.19); transcranial direct current stimulation (tDCS) improved CRS-R (MD 2.08, 0.63-3.25). Peripheral and sensory approaches were robust: **acupuncture** improved GCS (MD 2.03, 1.54-2.52), GOS (RR 1.22, 1.16-1.29), and Efficacy Rate (RR 1.48, 1.40-1.56); multisensory stimulation improved GCS (MD 2.28, 2.02-2.54) and GOS (MD 1.11, 0.77-1.45). Right median nerve stimulation (RMNS) and family-centered sensory-affective stimulation also yielded significant gains, while single-study Trigeminal nerve stimulation (TNS) effects were mixed.
Conclusion	tDCS, rTMS, median nerve stimulation, multisensory stimulation, and **acupuncture** emerge as leading strategies for TBI-related DoC. We highlight priorities for the field: adequately powered multicenter RCTs with standardized protocols, mechanistic studies to refine dosing and targets, and predictive tools for personalized therapy selection. This umbrella synthesis provides a pragmatic evidence map to accelerate recovery and improve long-term outcomes in this vulnerable population.

3. Clinical Practice Guidelines

⊕ positive recommendation (regardless of the level of evidence reported)
Ø negative recommendation (or lack of evidence)

3.1. Spanish Society of Neurorehabilitation (SSN, Spain) 2025 ⊕

Juárez-Belaúnde A, Colomer C, Dorado R, Laxe S, Miguens X, Ferri J, Rodríguez R, Pérez T, López C, Ríos M, González C, Pelayo R, Bernabeu M, Noé E, Gómez A, Quemada I. Guidelines: Basic principles of pain management in acquired brain injury. Recommendations of the Spanish Society of Neurorehabilitation. Neurologia (Engl Ed). 2025 May;40(4):380-405. https://doi.org/10.1016/j.nrleng.2025.04.005

Shoulder pain secondary to acquired brain injury, . Combination treatment with aromatherapy and **acupressure** is recommended to treat pain in HSP (hemiplegic shoulder pain). High A (IMSERSO). **Acupuncture** may be helpful. Moderate B (ICCPN). The usefulness of **acupuncture** as a coadjuvant treatment for HSP is unclear. Moderate B (AHA/ASA). Management of HSP (after comprehensive assessment of underlying causes) may include […] and **acupuncture**. Low IV (UEMS-PRMS)

3.2. Department of Veterans Affairs Department of Defense (VA/DoD, USA) 2021 Ø

VA/DoD clinical practice guideline for the management and rehabilitation of post-acute mild traumatic brain injury. Department of Veterans Affairs Department of Defense. 2021. 128. [219436]. https://www.healthquality.va.gov/guidelines/Rehab/mtbi/VADoDmTBICPGFinal508.pdf

There is insufficient evidence to recommend for or against the use of any of the following interventions for the treatment of patients with symptoms attributed to mild traumatic brain injury: a. **Acupuncture** b. Tai chi c. Meditation d. Mindfulness e. Yoga f. Massage g. Chiropractic therapy h. Cranial electrotherapy stimulation (CES) i. Sensory deprivation tanks (Neither for nor against Reviewed, New-added)

3.3. Ontario Neurotrauma Foundation (ONF, Canada) 2014 ⊕

Guidelines for Diagnosing and Managing Pediatric Concussion. Ontario Neurotrauma Foundation (ONF). 2014:132p. [197329].

5.4a(iii): Consider non-pharmacological treatments to improve sleep. Consider acupuncture or mindfulness-based stress reduction therapy.
5.4b(iv): Consider non-pharmacological, complementary and/or alternative medicine therapies for headache. Consider biofeedback, acupuncture.

3.4. Colorado Division of Workers' Compensation (DOWC, USA) 2013 ⊕

Colorado Division of Workers' Compensation. Traumatic brain injury medical treatment guidelines. Denver (CO): Colorado Division of Workers' Compensation. 2013; :119P. [168082].

Widely accepted treatments for post-traumatic headache may include, but are not limited to: interdisciplinary treatment, pharmacology, joint manipulation, physical therapy, massage, acupuncture, biofeedback, psychotherapy (i.e., cognitive behavioral therapy), and diet.
There is strong evidence that acupuncture and sham acupuncture are prophylactic for migraines. There is good evidence that acupuncture has similar results as medication prophylaxis. There is some evidence that sham acupuncture is better than no treatment for migraine prophylaxis. These procedures should only be continued if functional gains are documented.
Acupuncture, biofeedback, and cervical spinal manipulations are widely accepted and may be used for headaches or other painful conditions

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