

Complementary and Integrative Medicine for Tourette Syndrome



Traditional Chinese Medicine
Balance, Tai Chi, Acupuncture



Herbs and Supplements
Botanicals & Nutrients




Mind-Body Practices
Mindfulness & Relaxation



Lifestyle and Creative Outlets
Exercise, Music, Art

Tamara Pringsheim, Professor, University of Calgary

A collection of petri dishes on a light green background, each containing a different natural or synthetic substance. The substances include a yellow granular powder, a white crystalline solid, a clear gelatinous substance, a purple lavender stem, a cluster of yellow capsules, a dark charcoal-like substance, a brown mushroom, a green rosemary stem, and a purple crystalline powder.

Why talk about CIM in Tourette syndrome?

- Many people with TS express an interest in CIM in my clinical practice
- One US study found that 64% of people with TS seen in a specialist centre reported using complementary or alternative medicine
- Most used modalities
 - Prayer
 - Vitamins
 - Massage
 - Dietary supplements
- 80% did not consult a doctor before starting these treatments

Complementary and Integrative Medicine for the Treatment of Tourette's Syndrome

Tamara Pringsheim, MD,^{1,*} Catherine Deans, BSc,¹ Saar Anis, MD,² Poonam Bhatia, MD,³ Kevin Black, MD, PhD,⁴ Yildiz Degirmenci, MD, PhD,⁵ Donald Gilbert, MD,⁶ Andreas Hartmann, MD,⁷ Mariam Hull, MD,⁸ Irene Malaty, MD,⁹ Davide Martino, MD,¹ Alex Medina Escobar, MD,¹⁰ Pablo Mir, MD, PhD,¹¹ Christelle Nilles, MD,¹² Marianna Sarchioto, MD,¹³ Jibrin Sammani Usman, PhD,¹⁴ Harini Sarva, MD,¹⁵ Katarzyna Smilowksa, MD,¹⁶ Natalia Szejko, MD, PhD,¹⁷ Kinga Tomczak, MD, PhD,¹⁸ Daniel van Wamelen, MD, PhD,¹⁹ and Yulia Worbe, MD, PhD²⁰

Risk of Bias Assessment

Class I Criteria

- Randomized controlled clinical trial (RCT) in a representative population
- Triple-masked studies (i.e. the patient, treating provider, and outcome assessors are unaware of treatment assignment)
 - Relevant baseline characteristics of treatment groups (or treatment order groups for crossover trials) are presented and substantially equivalent between treatment groups, or there is appropriate statistical adjustment for differences
- Additional Class I criteria:
 - a. Concealed allocation
 - b. No more than two primary outcomes specified
 - c. Exclusion and inclusion criteria clearly defined
 - d. Adequate accounting of dropouts (with at least 80 percent of participants completing the study) and crossovers
 - e. For noninferiority or equivalence trials claiming to prove efficacy for one or both drugs, the following are also required*:



Complementary and Integrative Medicine (CIM) for Tourette Syndrome



Biofeedback



Deep Breathing



Hypnosis



Mind-Body & Psychological Practices



Mindfulness



Resource Activation

Core Mind-Body Techniques

Includes biofeedback, deep breathing, hypnosis, mindfulness, and resource activation for symptom control.



Relaxation Therapy

Specifically studied as a standalone therapeutic method for managing TS symptoms.



Exercise



Dance



Music Therapy



Art Therapy

Creative and Physical Outlets

Encompasses exercise, dance, music therapy, and art therapy as integrative treatments.



Traditional Chinese Medicine (TCM)



Dietary Changes



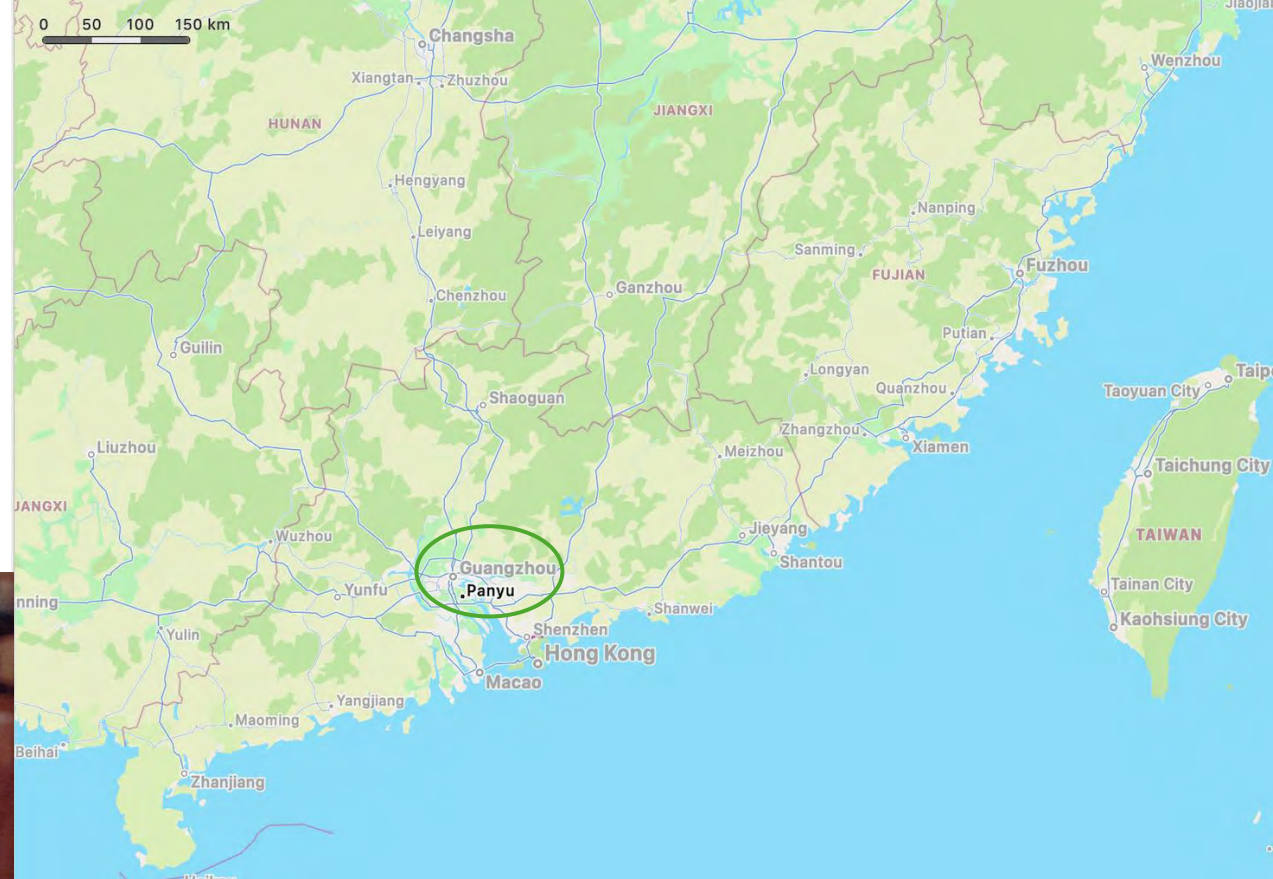
Supplements

Traditional and Nutritional Care

Includes Traditional Chinese Medicine (TCM), dietary changes, and the use of supplements.



Traditional Chinese Medicine



Traditional Chinese Medicine: Restoring the Balance of Qi

THE PHILOSOPHY OF BALANCE



Qi: The Vital Life Force

A fundamental energy that exists within the body to sustain life.



The Interplay of Yin and Yang

Health depends on the balance of these opposite and complementary forces.



Interconnection with Nature

Human health is deeply linked to and influenced by the forces of nature.



TRADITIONAL TREATMENTS

Acupuncture and Moxibustion

Restoring balance using needles or the burning of herbal leaves.



Physical and Herbal Therapies

Includes cupping, massage, and the use of specific herbal remedies.



Tai Chi

A movement-based practice used to regain and maintain internal harmony.



Chinese Herbal Remedies for TS

- Tian Ma (rhizome gastrodiae) and You Teng (ramulus uncariae) are the classic herbal pair used for treatment of TS
- Several different Chinese herbal medicines include these ingredients
- **Shaoma Zhijing (also known as 5-Ling granule, Zhidong granules)**
- Ningdong granules
- Changma xifeng tablets
- Jiuwei Xifeng granules



A collection of various herbs in white pots arranged on a wooden slat wall. The herbs include green leafy plants, purple flowers, and some with brown leaves. The background is a dark, semi-transparent overlay.

Shaoma Zhijing Ingredients

Tian Ma / Rhizome Gastrodiae

- Used for 2000+ years
- Also used in TCM for seizures, tetanus, paralysis, numbness, arthritis, headache, dizziness
- Gastrodin becomes gastrodigenin after crossing BBB
- May reduce levels of inflammatory factors, such as interleukin-6, interleukin-1beta, and TNF-alpha in the serum and striatum
- Hypothesized to alleviate tics through regulation of expression of the dopamine transporter



You Teng / Ramulus Uncariae cum uncis

- Also known as Cat's Claw
- Has anticonvulsant and antihypertensive properties
- Used in vertigo and restlessness
- Proposed mechanisms
 - Diminishes striatal dopamine levels
 - Reduces expression of interleukin-6, interleukin-1beta, TNF-alpha in the serum and striatum





Suan Zao Ren & Wu Wei Zi

-
- Semen Ziziphi spinosae (Suan Zao Ren)
 - Seeds of shrub plant
 - Used in TCM for insomnia, depression, palpitations, sweating
 - Fructus Schisandrae Cinensis (Wu Wei Zi, Eastern Prince)
 - Dried ripe fruit
 - Used for sedative, hypnotic, anxiolytic effects

Proposed mechanism: Up regulation of GABA receptor expression, resulting in sedative and hypnotic effects

Shaoma Zhijing: Ingredients

- Radix Paeoniae Alba (white peony root)
 - Alleviates muscle tension and pain
 - Calm agitation
- Fructus Tribuli
 - Improves depression and agitation
- Lucid Ganoderma (medicinal mushroom also known as Reishi)
 - Used as a sedative and tranquilizer for dizziness and insomnia
- Caulis Polygoni multiflora
 - Dried stem
 - Used to calm the mind and alleviate insomnia



Shaoma Zhijing: Ingredients

- Fructus Gardeniae (also known as Zhi Zi or cape jasmine fruit)
 - Dried ripe fruit of gardenia jasminoides
 - Used to reduce fever, irritability, restlessness, reduce inflammation and detoxify
 - Used traditionally to treat jaundice and protect liver function, may help reduce anxiety, improve sleep
- Rhizome Arisaematis cum bile/Dan Nan Xing
 - Created by fermenting the fine powder of arisaema rhizome with animal bile
 - Used for productive cough, seizures, anti-inflammatory/antipyretic
- Radix Scutellariae (also known as Chinese Skullcap)
 - Dried root of scutellaria baicalensis Georgi, a perennial herb in the mint family
 - Used to dry dampness and detoxify
 - Rich in flavonoids
 - Used for infections, inflammation, hypertension, digestive issues



Shaoma Zhijing: Studies in TS

Zheng 2016, Class I RCT

Multi-site, double-blind, randomized controlled trial

603 children and adolescents 5-18 years

Inclusion Criteria

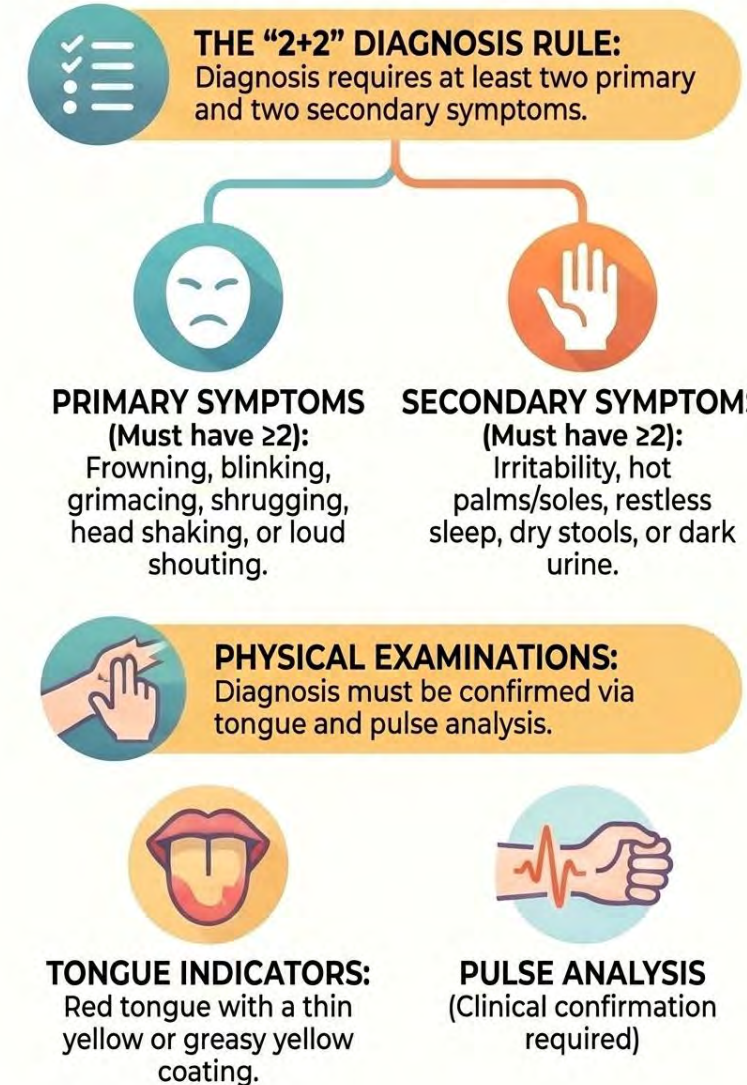
- Diagnosis of TS based on DSM-IV criteria
- Moderate or severe symptoms on YGTSS global score >30

Diagnostic Criteria for Hyperactive Liver Wind Syndrome

CORE PATHOLOGICAL CONCEPTS



CLINICAL DIAGNOSTIC CRITERIA



Zheng 2016

Exclusion Criteria

- ADHD, OCD, ASD

Interventions

- Shaoma Zhijing vs. placebo vs. tiapride for 8 weeks

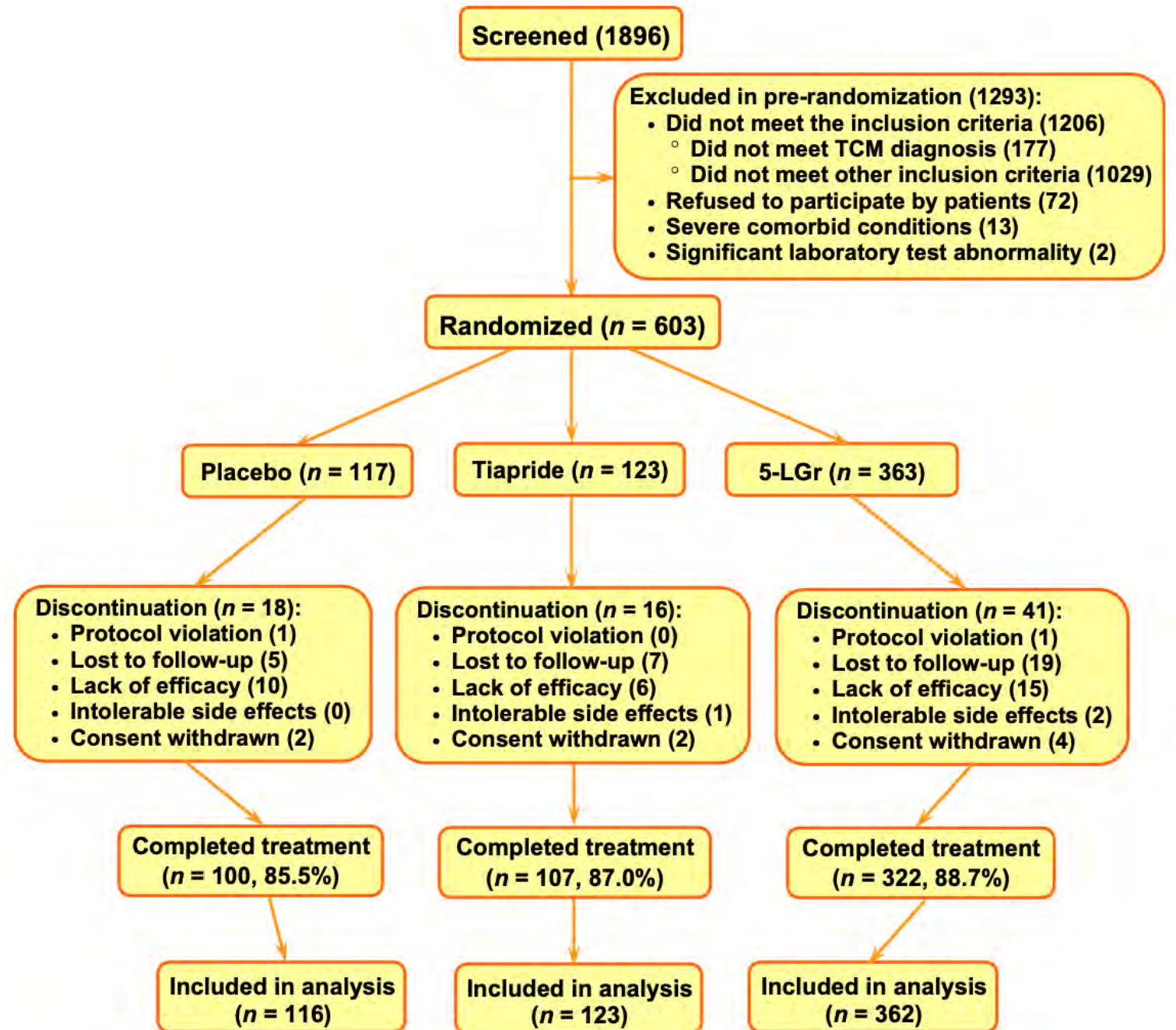
Randomization and Blinding

- Patients who fulfilled the inclusion were assigned to Shaoma Zhijing, tiapride or placebo treatment in a ratio of 3:1:1 using a random block scheme
- Allocation concealed

Treatment Protocol

- Shaoma Zhijing: 15 or 22.5 grams three times daily based on age (5-12 vs 13-18)
- Tiapride: 100 mg or 200 mg twice daily x 2 weeks, followed by 200 mg or 400 mg twice daily based on age (5-12 vs 13-18)

Study Flow Diagram



Study Baseline Characteristics

Table 2 Baseline characteristics of patients with TD

Variables ^a	Placebo (<i>n</i> = 117)	Tiapride (<i>n</i> = 123)	5-LGr (<i>n</i> = 363)	All (<i>n</i> = 603)
Male, <i>n</i> (%)	98 (83.8)	107 (87.0)	306 (84.3)	511 (84.7)
Age (years)	9.9 ± 2.8	10.0 ± 3.1	9.6 ± 3.1	9.8 ± 3.0
Ethnicity, <i>n</i> (%)				
Han	113 (96.6)	118 (95.9)	346 (95.3)	577 (95.7)
Others	4 (3.4)	5 (4.1)	17 (4.7)	26 (4.3)
No. (%) of patients with family members having mental illnesses	7 (6.0)	8 (6.5)	13 (3.6)	28 (4.6)
No. (%) of patients with significant comorbid psychiatric symptoms	5 (4.3)	5 (4.1)	12 (3.3)	22 (3.6)
Obsessions and compulsions	2	1	6	9
Generalized anxiety	3	3	5	11
Hyperactivity and impulsivity	0	1	1	2
Duration of the illness, <i>n</i> (%)				
≥1 years	58 (49.6)	67 (54.5)	199 (54.8)	324 (53.7)
≥3 years	22 (18.8)	30 (24.4)	81 (22.3)	133 (22.1)
≥5 years	37 (31.6)	26 (21.1)	83 (22.9)	146 (24.2)
No. (%) of patients under medication when entry	13 (11.1)	18 (14.6)	46 (12.7)	77 (12.8)
Antipsychotics	10	16	42	68
SSRIs/SNRIs ^b	2	2	3	7
Others	1	0	1	2
Body height (cm)	140.7 ± 16.6	142.0 ± 18.5	139.7 ± 17.6	140.8 ± 17.6
Body weight (kg)	36.8 ± 13.0	38.2 ± 14.5	35.5 ± 13.1	36.8 ± 13.4
Body mass index (BMI)	18.8 ± 4.5	19.4 ± 4.0	18.2 ± 4.2	18.8 ± 4.2
Baseline global YGTSS score	50.2 ± 12.2	51.4 ± 11.8	52.0 ± 13.0	51.2 ± 12.6

Results

Table 3 Treatment outcomes measured with YGTSS in patients with TS^a

Variables	Placebo (<i>n</i> = 116)		Tiapride (<i>n</i> = 123)		5-LGr (<i>n</i> = 362)	
	Mean ± <i>SD</i>	Within-group effect size	Mean ± <i>SD</i>	Within-group effect size	Mean ± <i>SD</i>	Within-group effect size
Global						
Baseline	50.0 ± 12.1		51.4 ± 11.8		52.1 ± 12.8	
Week 2	44.4 ± 14.0	0.428	43.2 ± 14.7	0.615	44.2 ± 14.6	0.575
Week 8	31.5 ± 15.2	1.347	21.2 ± 13.8	2.352	22.3 ± 15.1	2.129
TTS						
Baseline	22.7 ± 6.7		23.1 ± 6.9		23.7 ± 6.8	
Week 2	19.9 ± 7.7	0.388	19.2 ± 7.4	0.545	19.6 ± 7.3	0.581
Week 8	14.4 ± 7.5	1.167	10.1 ± 6.4	1.953	10.6 ± 6.8	1.926
Impairment						
Baseline	27.3 ± 8.0		28.3 ± 8.3		28.3 ± 8.3	
Week 2	24.6 ± 8.1	0.335	23.9 ± 8.7	0.518	24.4 ± 9.0	0.451
Week 8	17.2 ± 9.2	1.172	11.2 ± 8.1	2.073	11.6 ± 9.7	1.850
5-LGr vs. placebo						
	Between-group effect size	<i>p</i> value	Tiapride vs. placebo		5-LGr vs. Tiapride	
			Between-group effect size	<i>p</i> value	Between-group effect size	<i>p</i> value
Global						
Week 2	.014	.897	.084	.519	.069	.508
Week 8	.608	<.001	.710	<.001	.075	.472
TTS						
Week 2	.041	.701	.093	.461	.055	.586
Week 8	.545	<.001	.618	<.001	.075	.489
Impairment						
Week 2	.023	.831	.083	.521	.057	.588
Week 8	.584	<.001	.682	<.001	.032	.756

^aOverall statistical significance was analyzed using a linear mixed-effect model analysis. Pairwise comparisons were further conducted between the three groups one-way analysis of variance (ANOVA). TS, Tourette syndrome; YGTSS, Yale Global Tic Severity Scale. TTS, total tic score.

Results

Table 4 The incidence of major adverse events in the three groups of patients with TS

Adverse event	Placebo (n = 116)	Tiapride (n = 123)	5-LGr (n = 362)	χ^2 value	p value
Any	13 (11.2)	32 (26.0)	50 (13.8)	12.569	.002
→ Physical tiredness	1 (0.9)	9 (7.3)	2 (0.6)	22.414	<.001
Reduced appetite	1 (0.9)	2 (1.6)	6 (1.7)	0.394	.821
Upper respiratory tract infection	12 (10.3)	10 (8.1)	40 (11.0)	0.846	.655
Nausea/vomiting	1 (0.9)	2 (1.6)	4 (1.1)	0.331	.848
Sweating	1 (0.9)	2 (1.6)	0	5.268	.072
Headache	0	2 (1.6)	1 (0.3)	4.089	.129
Diarrhea	1 (0.9)	0	9 (2.5)	4.033	.133
→ Sleep disturbance	0	11 (8.9)	3 (0.8)	14.666	<.001
Dizziness	0	5 (4.1)	3 (0.8)	9.260	.001
Lab testing abnormality	5 (4.3)	2 (1.6)	7 (1.9)	2.517	.284

Wang 2025

- Class II study comparing Shaoma Zhijing to Tiapride in 80 children and adolescents with TS and hyperactive liver wind syndrome
- Study nearly identical to Zheng 2016

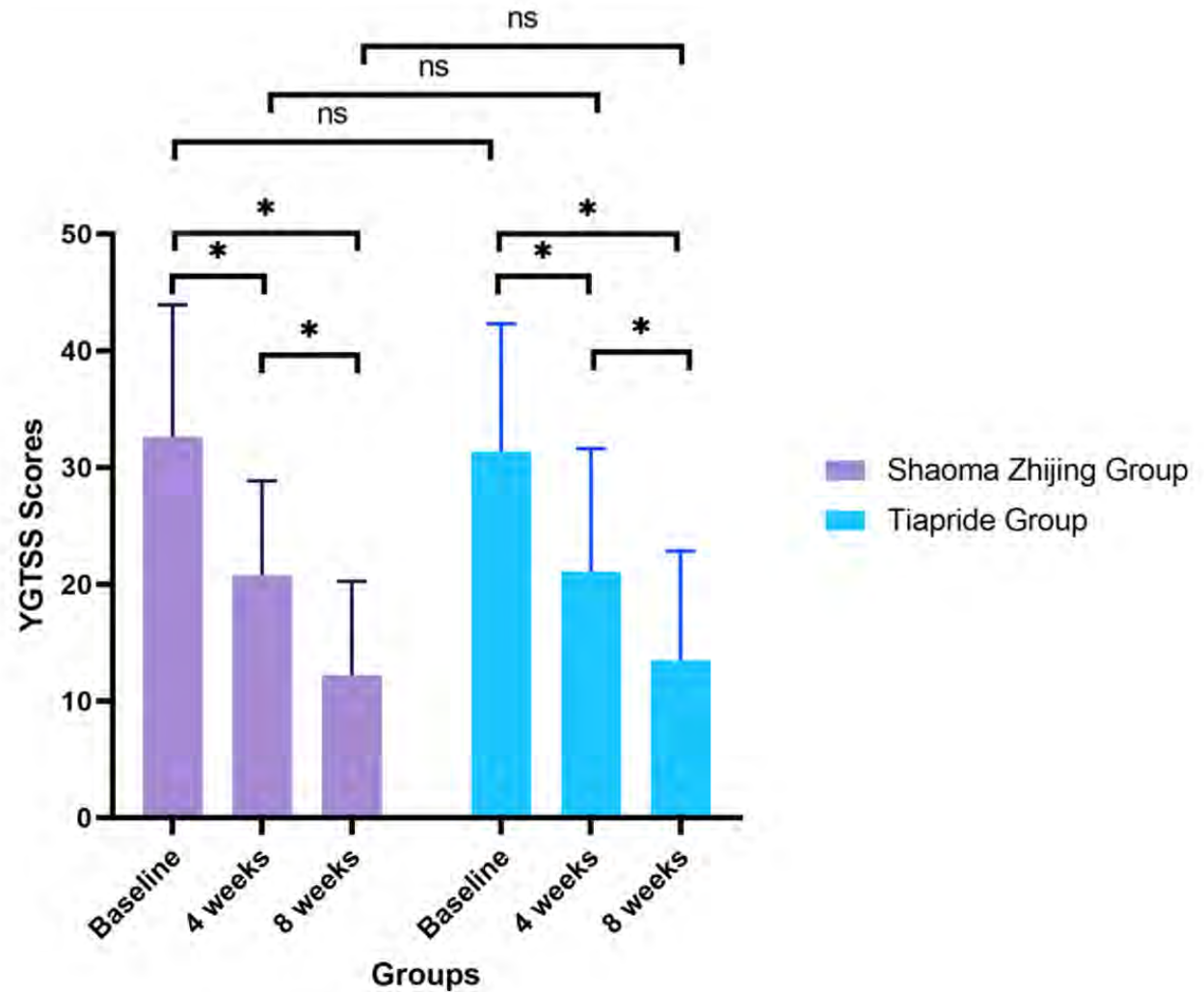


FIGURE 2
Comparison of YGTSS scores in two groups at different times ($\bar{x} \pm s$).

Wang 2025

Serum neurotransmitters

- Venous blood samples collected in the early morning after fasting from both groups at baseline and after 8 weeks of treatment
- The levels of neurotransmitters in the plasma were analyzed using ultra-high-performance liquid chromatography- tandem mass spectrometry
- After 8 weeks, serum levels of glutamic acid, aspartic acid, dopamine, norepinephrine, and epinephrine in both groups were significantly lower than baseline ($P < 0.05$), while GABA levels were significantly higher ($P < 0.05$)
- MAJOR CAVEAT: Serum neurotransmitter levels are a poor proxy for brain activity
 - Separation of systems
 - Lack of biological specificity
 - Instability
 - Sampling artifacts

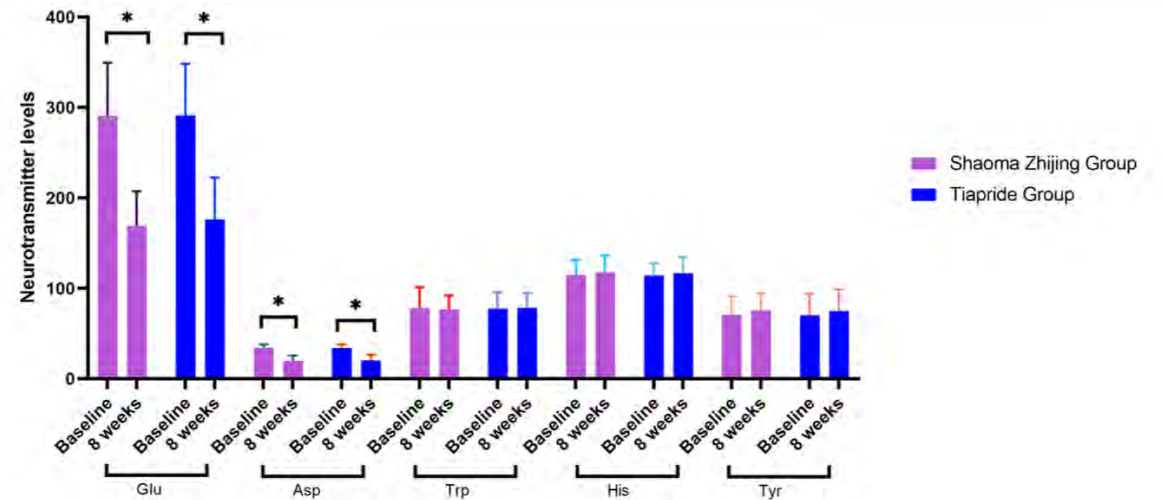


FIGURE 4 Comparison of serum neurotransmitter levels in two groups.

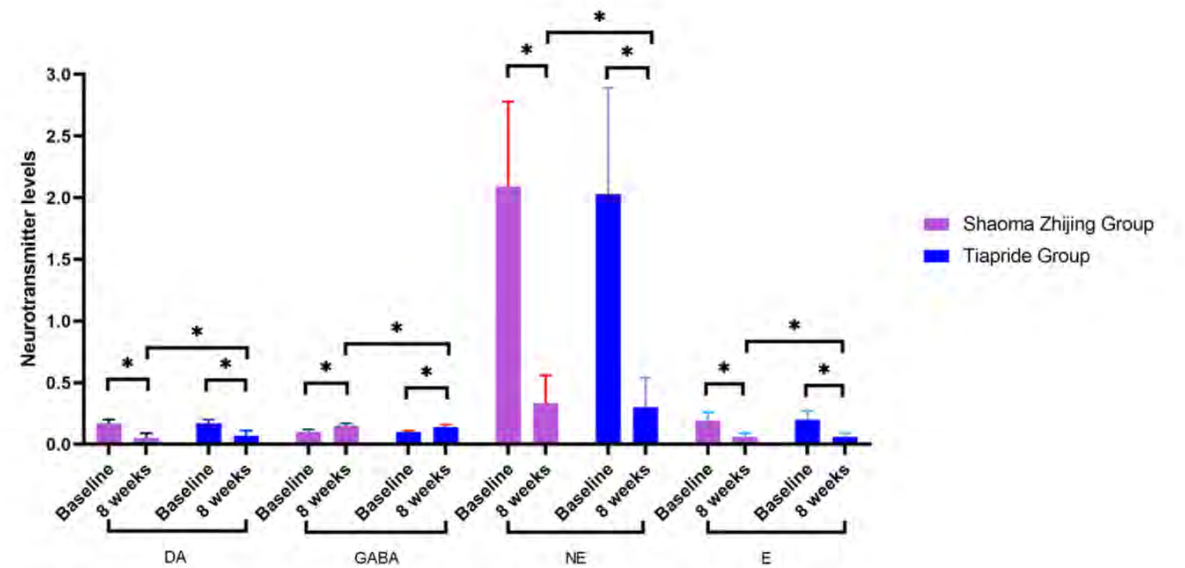


FIGURE 5 Comparison of serum neurotransmitter levels in two groups.

Mechanistic studies of Shaoma Zhijing



- Chinese researchers are trying to elucidate the mechanisms of action of shaoma zhijing using rat models
- Iminodipropionitrile (IDPN)
 - IDPN is a neurotoxin that induces an encephalopathy, mainly through structural damage to the vestibular and cerebellar systems – no clear overlap with CSTC circuits
 - Rats display head bobbing, circling, backward locomotion
- 2, 5-dimethoxy-4-iodoarylamine (DOI)
 - Rats are injected with DOI, which acts as a highly selective serotonin 5-HT_{2A} receptor agonist
 - Induces rapid head and shoulder twitches
- Their Findings: Shaoma Zhijing significantly ameliorates IDPN- and DOI-induced stereotyped behaviours
- The Problem: Neither model has adequate construct validity for TS and largely rely on phenotypic resemblance. Good translational models need to recapitulate the pathophysiological mechanism of the condition.

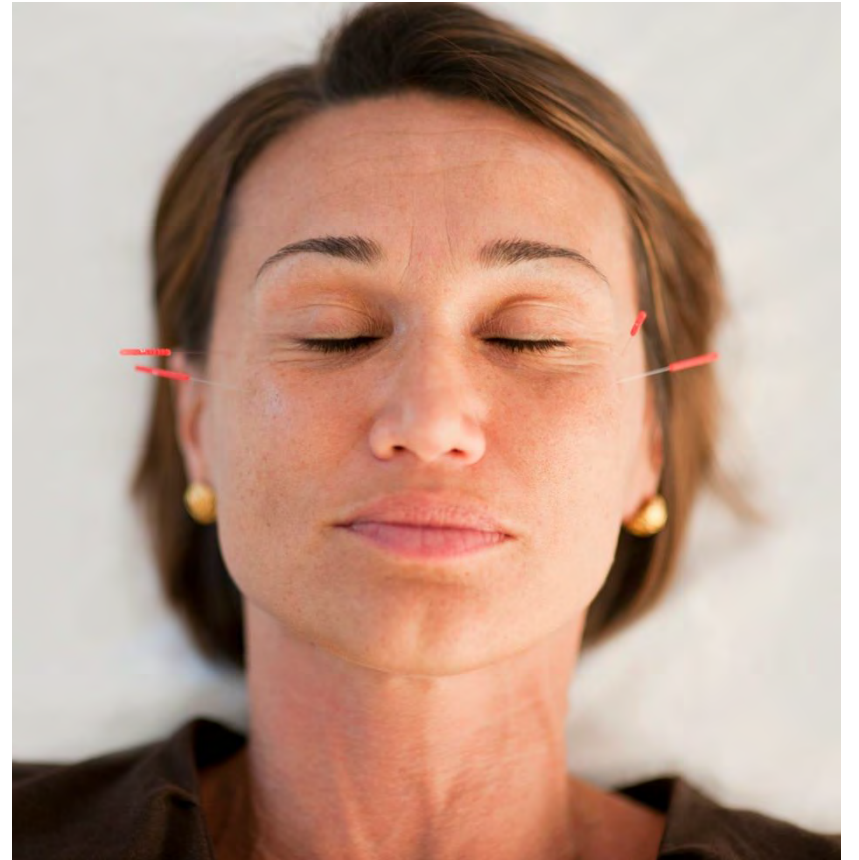
Acupuncture



- Used for 2000+ years
- Underlying principle: Good health is attained through the unobstructed circulation of Qi
- Qi moves through pathways called meridians, disruptions to flow can cause illness
- Acupuncture aims to restore and balance Qi
- Scalp acupuncture is frequently used to treat neurological conditions
 - Insertion of needles into precise regions that correspond to specific areas of the brain; believed to activate the underlying brain regions
- Body acupuncture used for pain, gastrointestinal conditions, anxiety, depression
 - Utilizes points along the meridians, with each linked to specific organs and health conditions
- Auricular acupuncture targets the ear as a microsystem mirroring the entire body
 - Used in addiction, pain and for inducing calmness

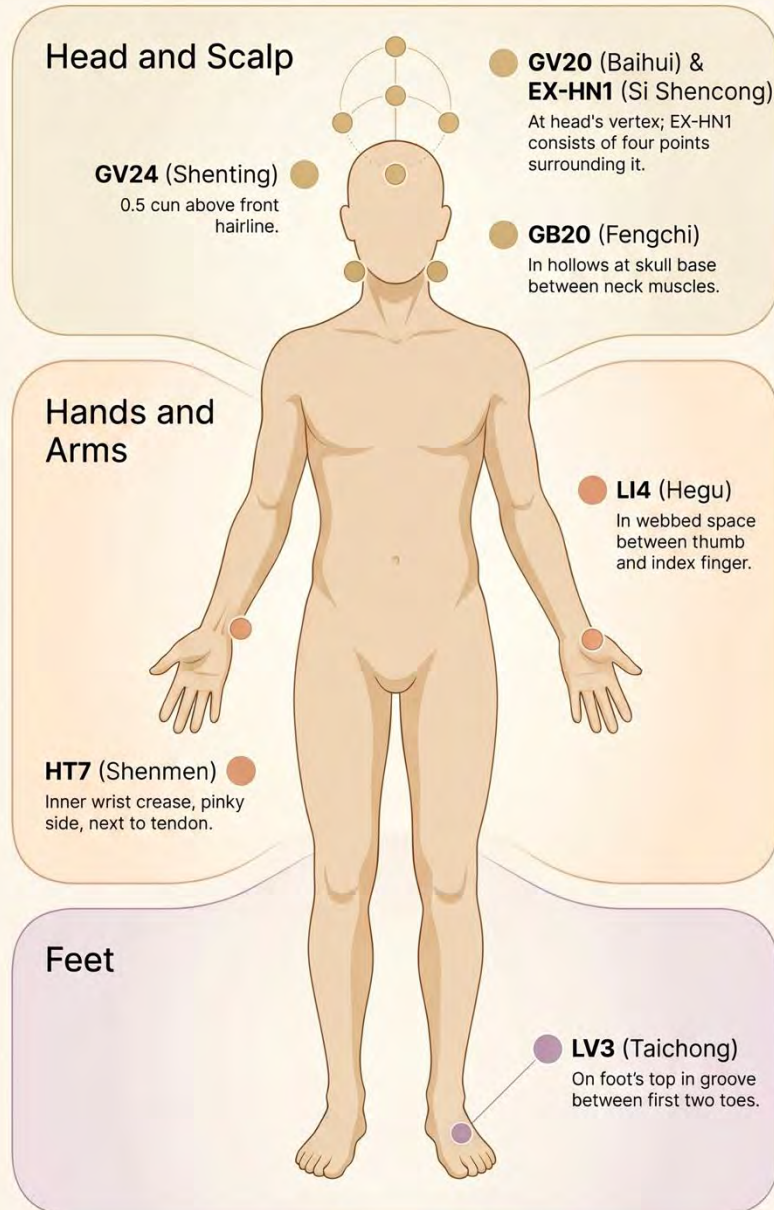
Acupuncture

- Electroacupuncture
 - Involves insertion of two needles into specific points and the use of a mild electric current
 - Useful for pain and neurological conditions
 - Electrical device delivers pulses; frequency and strength of pulses can be adjusted
 - Thought to increase flow of qi more effectively than manual stimulation
- Moxibustion
 - Uses a heat source, from burning mugwort herb, near or on specific acupuncture points, to enhance therapeutic benefits
- Several forms of acupuncture have been used for tics, specifically electroacupuncture and scalp acupuncture.



Mapping the Seven Key Acupoints for Mental Harmony

A visual guide to locating essential acupoints for harmonising the nervous system and reducing stress.

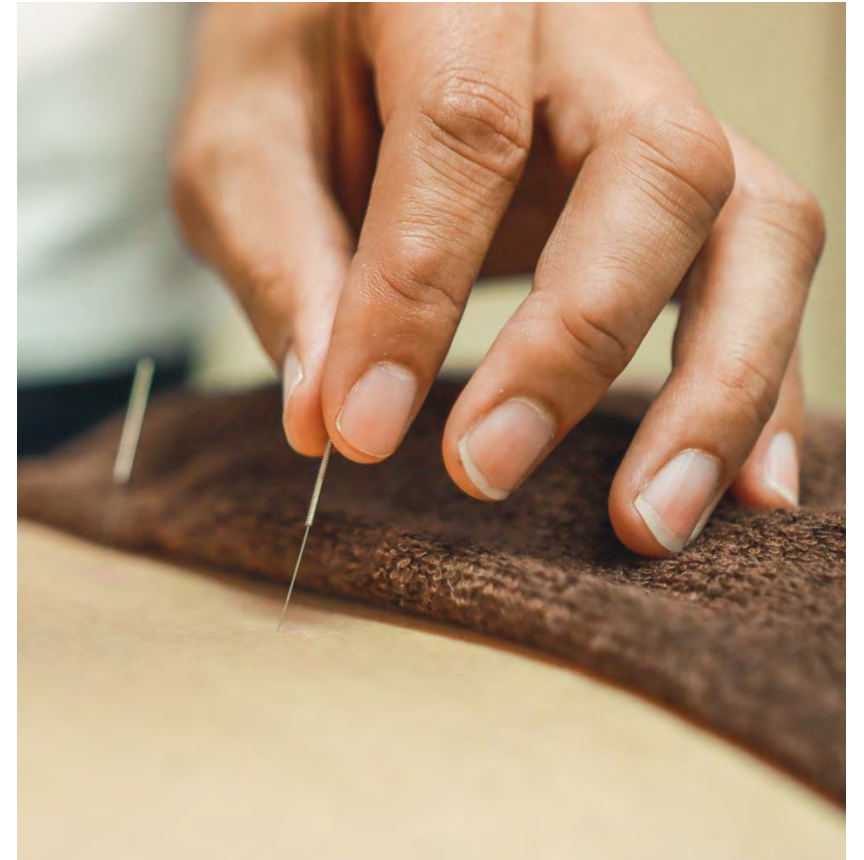


Acupuncture

- Two systematic reviews summarize literature on acupuncture for tics
- Lu 2021 – Acupuncture
- Li 2024 – Acupuncture combined with herbal medicine
- Acupoints used in studies focus on regulating the mind and calming the liver

Lu 2021, Acupuncture for TS

- Systematic review and meta-analysis of RCTs of acupuncture for TS in children and adolescents
- ICD10 diagnostic criteria for TS
- Primary outcome: Change in YGTSS global score
- Risk of bias assessed using Cochrane Collaboration's bias risk assessment tool
 - Random sequence generation
 - Allocation concealment
 - Blinding of participants, researchers and outcome assessors
 - Completeness of outcome data
 - Selective outcome reporting



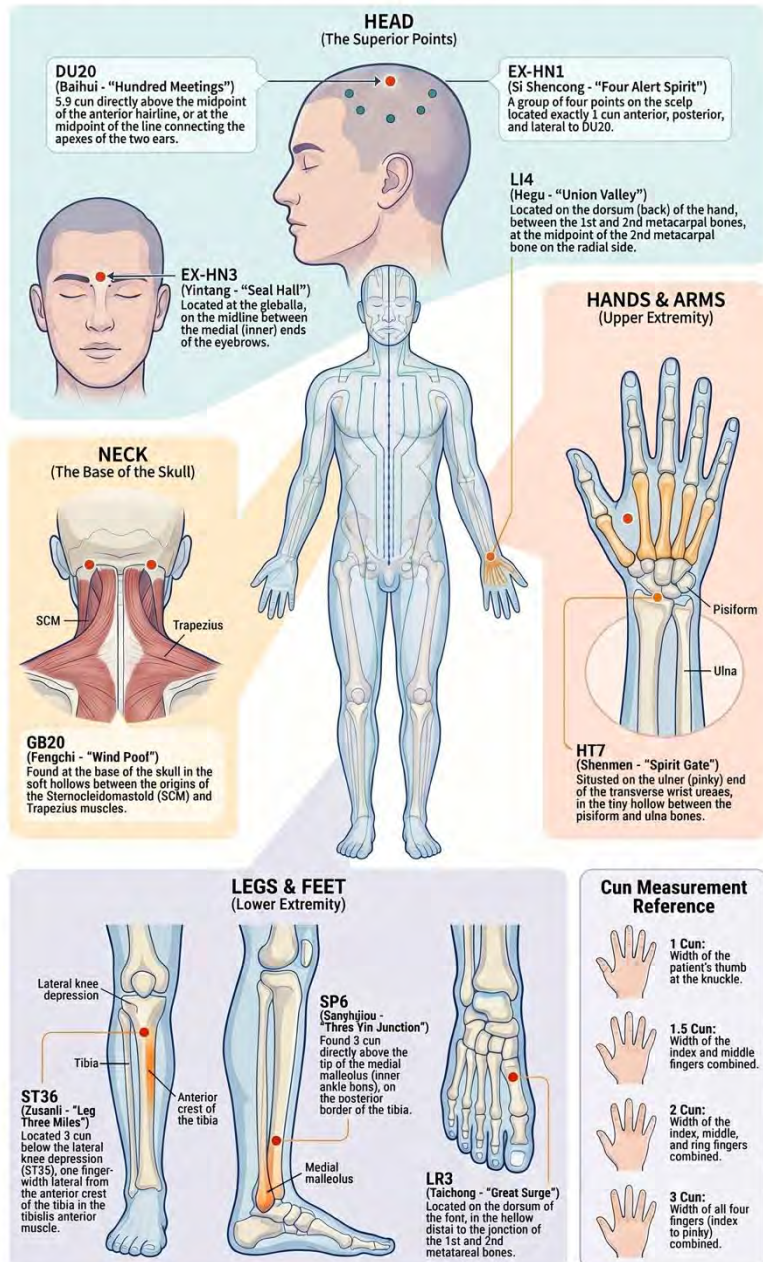
Lu 2021, Acupuncture for TS

- 22 studies met inclusion criteria
 - 1668 participants
 - All conducted in China and reported in Chinese
- Interventions and Comparators
 - Manual acupuncture, scalp acupuncture, electroacupuncture
 - Antipsychotics were the most common comparators (19 studies)
 - Duration of treatment ranged from 1 to 3 months
- Risk of bias
 - Most studies rated at high risk of bias for blinding of participants, researchers and outcome assessors, and uncertain risk of bias for allocation concealment
 - Evidence of publication bias present

Lu 2021, Acupuncture for TS

- 15 studies evaluated changes in YGTSS global scores
 - Mean difference (MD) -2.79 (95 % CI -4.75, -0.82), favouring acupuncture over active comparators
- Sub analysis
 - Manual acupuncture MD -2.36 (95% CI -4.74, 0.02)
 - Electroacupuncture MD -3.83 (95% CI -5.32, -2;34)
- Lower risk of adverse events reported after acupuncture treatment RR 0.26 (95% CI 0.17-0.41)

The Essential Nine: A Guide to Precise Acupoint Anatomy



Li 2024

- Systematic review and meta-analysis of RCTs of acupuncture combined with herbal medicine, compared to Western medicine
- Studies that included participants with psychiatric comorbidities were excluded
- 18 studies with a total of 1400 participants included
- Study duration 4-24 weeks (median 12)
- Type of acupuncture and content of herbal medicines used in individual studies not described
- Western medicine comparators: tiapride and haloperidol

Li 2024

- All studies rated at high risk of bias
 - Measurement of outcome
 - Randomization process
 - No blinding or allocation concealment
 - Deviations from intended interventions
- Evidence of publication bias present
- 11 studies reported YGTSS as outcome
- Mean difference -3.91, 95% CI -5.49, -2.33, favouring acupuncture combined with herbal medicine over antipsychotic treatment
- Lower risk of adverse events in acupuncture/herbal medicine group
 - RR 0.20, 95% CI 0.14, 0.30
- Recurrence rate after the end of treatment lower in acupuncture/herbal medicine group
 - RR 0.27, 95% CI 0.13, 0.52

Acupuncture for TS: Mechanisms

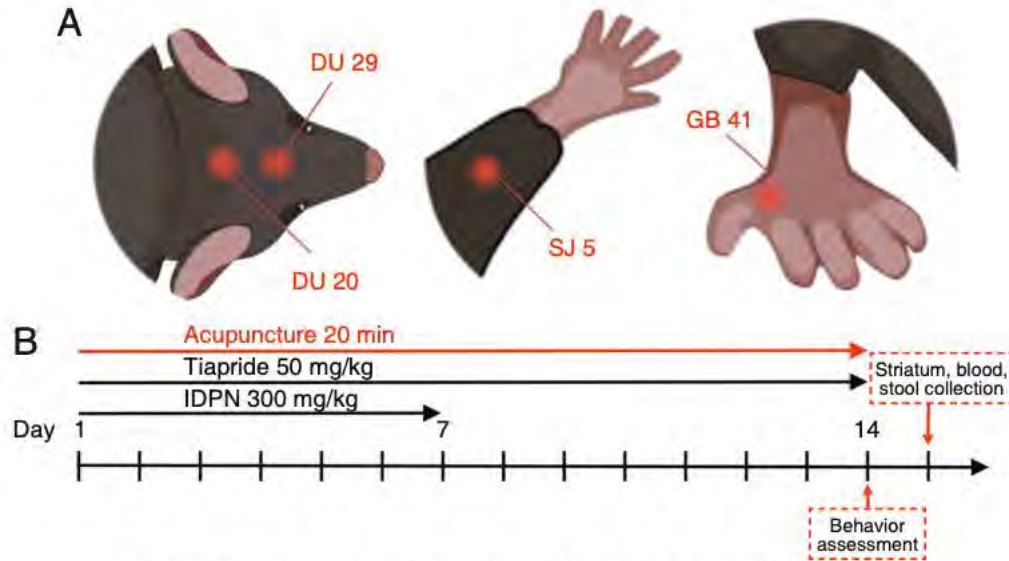


Figure 1. Protocol of Acupuncture on IDPN-Induced TS Mice

Notes: (A) Acupuncture on DU 29, DU 20, SJ 5 and GB 41 of TS mice treated with IDPN; (B) Time flow diagram; IDPN: 3,3'-iminodipropionitrile, TS: tourette syndrome, the same below

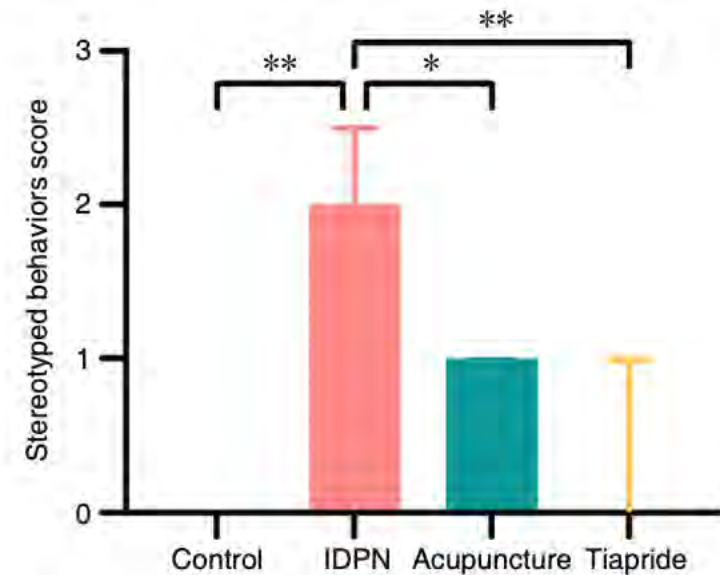


Figure 2. Effect of Acupuncture on Stereotypic Behavior Scores of IDPN-Induced TS Mice ($\bar{x} \pm s$, $n=9$)

Notes: * $P<0.05$, ** $P<0.01$

Same concern regarding use of this animal model in TS

Massage

Tui Na: The Art of Balancing Energy

CORE TECHNIQUES AND APPLICATION

Essential Hand Manipulations



Utilises brushing, kneading are used to massage muscles and tendons.

Activating the Eight Gates



Involves rubbing specific areas between joints to influence the flow of Qi.



GOALS AND HOLISTIC BENEFITS

Harmonising Defensive Qi



Stimulates energy flow within the meridians to promote internal balance.

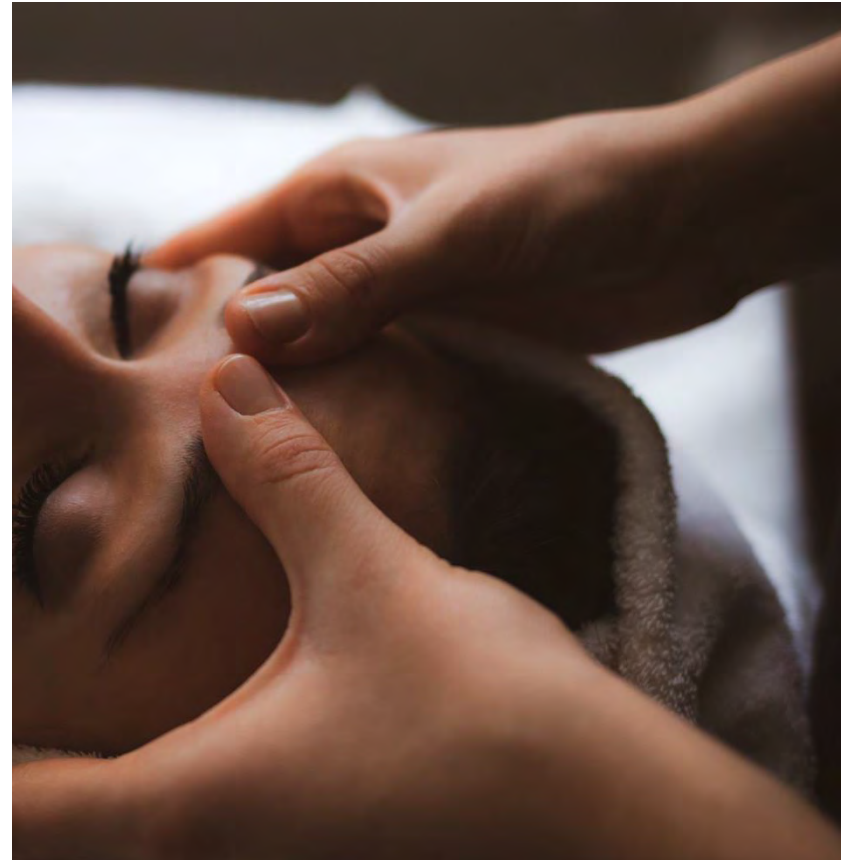
Physical and Emotional Versatility



Addresses physical ailments while simultaneously enhancing energy levels and emotional relaxation.

Tui Na Massage

- One systematic review and meta-analysis summarizing literature on massage therapy for tics in children
- Wu 2024
- 19 studies, all performed in China and published in Chinese, 1423 participants
- Intervention group received Tui Na, with or without herbal TCM
 - Frequency of Tui Na not described
- Control groups given conventional drug therapy with antipsychotics or herbal TCM
 - TCM treatments not described
- Most studies included fewer than 100 participants and lasted 3-12 weeks



Tui Na Massage



Included studies rated at high risk of bias

Allocation concealment
Blinding of participants and outcome assessors



No evidence of publication bias




12 studies reported YGTSS as outcome, including 854 participants



Mean difference -2.42, 95% CI -3.97, -0.88, favouring massage



Lower risk of adverse events with massage RR 0.26, 95% CI 0.14, 0.49



Mind body practices

Mind body practices

Hypnosis

- 5 Class IV studies
 - Lazarus 2010
 - Young 1988
 - Kohen 1987, 1995
 - De Stavola 1968
- All report some beneficial effects

Deep breathing

- Kaido 2020
 - Deep slow nasal respiration
 - Class IV
 - Positive study

Mindfulness

- Class II RCT by Reese 2025
- Compared videoconference-delivered group mindfulness-based intervention for tics (MBIT) to videoconference-delivered group psychoeducation, relaxation and supportive therapy (PRST) in 32 adults
- 8 weekly 90-minute group treatment sessions and home practice
- Significantly greater improvement in tic severity on the YGTSS in participants receiving MBIT
- Mean difference -7.34 points (95%CI -13.97, -0.72) in tic severity on the YGTSS
- Significant decrease in YGTSS impairment
- Two previous Class IV studies report beneficial effects



Relaxation therapy



1 Class II study

Bergin 1998

Relaxation therapy group showed greater mastery of relaxation than minimal treatment group at study end

But no difference between relaxation and control group in measures of tic severity at endpoint



2 Class IV studies

Peterson 1992, 2022

Reduction in tics reported with treatment



A close-up photograph of a silver spoon held over a white bowl. The spoon is filled with a variety of pills and capsules, including several translucent yellow capsules, a prominent red oval pill, and several dark brown capsules. The bowl below is also filled with a large quantity of similar pills, which are out of focus. The background is a plain, light-colored surface.

Supplements

Class I Studies

- Bloch 2016
 - N-acetylcysteine vs placebo
 - No significant difference with placebo on YGTSS TTS
- Wu 2021
 - Lactobacillus Plantarum vs placebo
 - No significant difference between treatment and placebo on YGTSS TTS



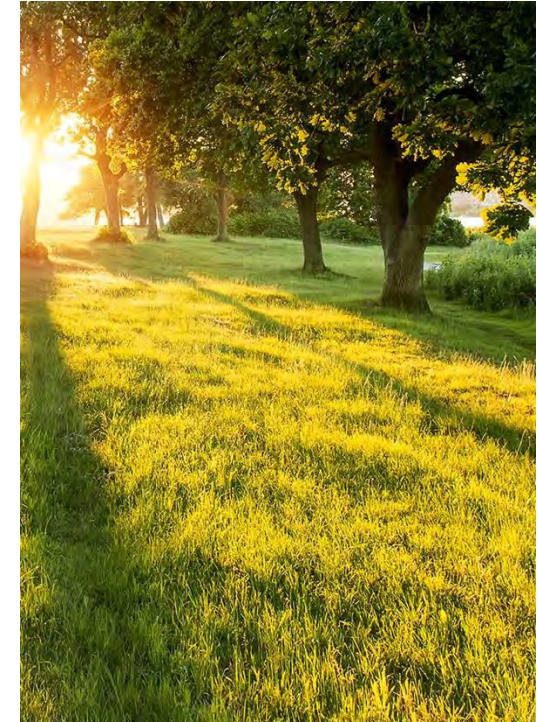


Class II Studies

- Omega-3 fatty acids
 - Gabbay 2012
 - Participants were 6 to 18 years
 - Randomized to 500-1000 mg of omega-3 fatty acid or placebo for 20 weeks (ratio of EPA:DHA 2:1)
 - Found an improvement in YGTSS tic-related impairment with omega-3 but not in YGTSS TTS

Class IV Studies

- Vitamin D
 - Mohamed 2025
 - Improvement in YGTSS TTS -5.87 ($-8.0, -3.74$) in high dose vs low dose group
- L-theanine and vitamin B6
 - Rizzo 2022
 - Greater improvement in YGTSS TTS in supplement group vs psychoeducation group
 - Mean difference -3.7 ($-7.19, -0.21$)



A person wearing a white, textured robe is sitting in a meditative pose. Their hands are held in a mudra, with the index and middle fingers touching and the thumb, ring, and pinky fingers extended. The background is a warm, bokeh light effect, suggesting a peaceful and serene environment. The text "Other integrative and lifestyle approaches" is overlaid on the image in a white, sans-serif font.

Other integrative and lifestyle approaches

Exercise

- 2 Class IV studies
 - Nixon 2014/Jackson 2020
 - Packer-Hopke 2014
- Both report beneficial effects





Dance

- Dina 2020
- Class III study
- Group level data were incompletely reported
- Authors report that movement to the song “Testa-Spalla” produced a significantly greater improvement in YGTSS Impairment scores compared to the control group, $d=0.81$, $p=0.04$.



Music

- 1 Class IV study
- Bodeck 2015
- Reports the effects of music (performance, after performance, mental imagery of performance, and listening to music) on tic severity
- All conditions reduce tics compared to baseline

Art therapy

- 1 Class II study
- Choi 2021
- Art therapy vs. waiting list control
- Authors report a significant group by time interaction on motor and vocal tic severity measured with the YGTSS in the intervention group
- Unable to calculate mean difference between groups based on data presented



Overall Summary

- There is limited and low-quality evidence on the use of complementary and integrative medicine for TS
- Most studies are small and at high risk of bias
- Inadequate evidence to support broad recommendations on the use of CIM for TS
- Clinicians should critically evaluate whether the interventions studied could be useful for individual patients and engage them in shared decision-making regarding their use



Summary Traditional Chinese Medicine for TS

- Best studied of all complementary and integrative therapies in TS
- High quality studies of herbal medicine
- Lower quality studies of acupuncture and massage
- Scientists are trying to determine physiological mechanisms
- While individual ingredients in herbal medicines can be purchased, availability of pharmaceutical grade preparations outside of China is uncertain
- Acupuncture and massage have low risk
- Studies outside of China and with higher methodological quality are needed before these treatments can be strongly or widely recommended



Other recommendations for future research

- Need for controlled studies of exercise, given the evidence to support the use of exercise in common comorbid conditions including ADHD, depression and anxiety
- Larger trial of online mindfulness (MBIT) is already in progress



Practical advice on CIM for people with TS

- There are several studies which support the efficacy of traditional Chinese herbal preparations, especially Shaoma Zhijing, but unfortunately pharmaceutical grade preparations are not currently widely available
- Tui na massage therapy, acupuncture, mindfulness
 - Often covered by health insurance plans
 - Low risk
 - Provide other health benefits
- Vitamin D - Health Canada
 - Recommended dietary intake 400 IU/day
- Omega 3 – Alberta Health Services
 - 200 to 500 mg of DHA and EPA per day recommended
 - Best sources are fatty fish, salmon, herring, mackerel, sardines, halibut, and light tuna.
 - Eat at least 2 servings of fatty fish each week
- Preliminary data of possible beneficial effects of exercise, dance, music and art on tic severity
 - These are generally low risk, feasible and enjoyable activities that can be done at home or in a group setting

