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Clinical Practice Guideline

Standardizing Tuina intervention for pediatric myopia: evidence-based guideline from a Delphi consensus panel

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ABSTRACT

Introduction Myopia is an escalating public health challenge worldwide, with a particularly high burden in China. Although conventional treatments are available, their effectiveness is often limited by issues related to adherence, cost, or safety. Traditional Chinese medicine (TCM), specifically Tuina therapy, offers a preventive approach, with studies suggesting its potential efficacy in the management of pediatric myopia. However, clinical adoption is hindered by lack of standardized treatment protocols. This study aimed to assess the efficacy and safety of Tuina therapy for pediatric myopia and establish a standardized protocol based on the Zhi Wei Bing (prevention first) theory. **Methods** A multi-method, consensus-based approach was employed, comprising three stages: (i) Problem Identification: Semi-structured expert interviews; (ii) Evidence Retrieval and Synthesis: A systematic literature search (up to September 2023) across Chinese and English databases; and (iii) Recommendation Formulation: A two-round Delphi process, involving 203 ophthalmologists and 76 Tuina specialists, achieved predefined agreement (≥60% consensus) on procedures, acupoint protocols, and TCM pattern differentiation. Recommendations were developed using evidence-to-decision frameworks and Good Practice Statements. Evidence quality and recommendation strength were assessed using the Grading of Recommendations Assessment, Development and Evaluation approach. **Results** Tuina therapy demonstrated favorable efficacy and safety in the prevention and treatment of low-degree myopia and pseudomyopia in children. A consensus was reached regarding five TCM patterns. A standardized acupoint protocol was established: 14 core acupoints for the preventive stage, 21 for progression management, and 25 for pattern differentiation. A combined strategy using both foundational and pattern-specific acupoints is recommended. The foundational protocol can be applied alone if no specific pattern is identified. Home-based eye exercises were endorsed as complementary strategies. **Conclusion** This study developed the first evidence-based standardized Tuina protocol for pediatric myopia, addressing a critical gap in non-pharmacological management. These findings suggest that Tuina is an effective and safe therapeutic approach.

KEYWORDS

myopia, Tuina, complementary therapy, consensus, Delphi, prevention first

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1. Introduction

Myopia is a major global health concern. By 2050, 50% of the world's 4.758 billion people are expected to develop myopia,[1] with Asian populations exhibiting 3–10 times higher (6.8%–21.6%) incidence rates than those among non-Asian populations (2.0%–2.3%).[2] In China, the heavy educational burden on children contributes to early-onset myopia,[3] and the prevalence of high myopia among adolescents aged 16–18 years is projected to rise from 7.3% in 2001 to 22.1% by 2050.[4] Refractive correction is achieved by optical correction methods, such as pharmacotherapy, refractive surgery, orthokeratology, contact lenses, and eyeglasses.[5] However, risks include corneal infection from contact devices,[6,7] high socioeconomic costs, and inappropriate correction that may worsen myopia severity.[8] Behavioral modifications, such as the 20-20-20 rule (taking a 20-s break every 20 min to look at something at least 20 feet away), can be beneficial but are limited by time demands and adherence challenges. Considering China's demographic environment, which is characterized by budgetary constraints, scalable solutions are crucial.

In traditional Chinese medicine (TCM), the term "Zhi Wei Bing" (or "prevention first") refers to taking proactive steps for maintaining good health, preventing illness before it arises, and following the yin and yang principles.[9] This concept is especially well-suited for treating and preventing myopia in children. Tuina, a TCM manual therapy involving hands-on physical manipulation, has shown promise in addressing clinical health concerns.[10] A meta-analysis of 28 randomized controlled trials (RCTs) demonstrated that eye exercises (self-administered Tuina) exhibited a substantial protective impact against myopia: performing exercises consistently (odds ratio [OR], 95% confidence interval [CI]: 0.75, 0.69–0.81), taking them seriously (OR, 95% CI: 0.47, 0.40–0.55), and performing them correctly (OR, 95% CI: 0.86, 0.76–0.97).[11] Furthermore, recent guidelines recommend Tuina for pediatric

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myopia.[12,13] However, despite these findings, clinics continue to struggle with the implementation of Tuina because of the lack of established operating procedures, ambiguous indications and contraindications, and inaccurate regimens, which hinder its widespread use and popularization in pediatric myopia. Therefore, to address these barriers, we gathered a panel of specialists in ophthalmology, Tuina, and TCM to establish evidence-based recommendations for Tuina in pediatric myopia.

2. Methods

2.1. Registration

This study was registered in the Practice guideline REgistration for transPAREncy (PREPARE; registration no.: PREPARE-2024CN249).

2.2. Consensus development group

The first step was to form a consensus development group (CDG) comprising experts in TCM, internal medicine, ophthalmology, pediatrics, acupuncture, Tuina, and methodology. Through consensus meetings, CDG members reviewed, edited, and refined the core content for finalizing the methods and processes for clinical guideline development.[14]

Eligibility criteria for Delphi consultation specialists included: at least 5 years of professional experience, expertise in relevant fields, interest in the research topic, willingness to participate, and timely completion of questionnaires within 1 week of receipt.

2.3. Clinical question identification

Clinical questions were identified through semi-structured, in-person interviews with pediatric Tuina and ophthalmology specialists. Appendix 1 provides the full interview outline.

2.4. Evidence retrieval, synthesis, and assessment

A comprehensive systematic search of eight databases, including PubMed, Embase, Cochrane Library, Epistemonikos, China National Knowledge Infrastructure (CNKI), Wanfang Database, Chinese Scientific Journal Database (VIP), and SinoMed, was conducted up to September 2023 to identify RCTs published in Chinese and English. High-quality systematic reviews and meta-analyses were prioritized. Appendix 2 presents the search strategies employed in several databases. NoteExpress 3.8 (Beijing Aegean Sea Lezhi Technology, Beijing, China) was used for literature management and Review Manager 5.3 (https://revman.cochrane.org/myReviews, accessed September 25, 2023) for statistical analysis. Evidence quality was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach, which considers the risk of bias (RoB), inconsistency, indirectness, imprecision, and publication bias. The GRADEpro (McMaster University and Evidence Prime Inc., Hamilton, Canada) was used to generate the summary of findings table. Recommendations were graded using the evidence-to-decision (EtD) frameworks. For clinical issues lacking evidence, consensus was achieved by integrating expert opinion through Delphi surveys.

The final evidence set included 11 guidelines, 246 RCTs, and one systematic review. Information on myopia definition, diagnosis, intervention techniques, indications, and contraindications was extracted and used to guide expert consensus. TCM pattern classifications were derived from clinical research and guidelines and then updated via consensus. To develop the acupoint protocol, data mining techniques were used to identify acupoints and their frequency in clinical studies.[16] Candidate acupoints were chosen for the Delphi questionnaire, and open-ended questions were incorporated to allow experts to add new acupoints. A meta-analysis was conducted to evaluate Tuina's effectiveness in pediatric myopia owing to limited prior evidence. Appendix 3 presents the guidelines included in the evidence section. The systematic review process, including the deconstruction of clinical questions, inclusion/exclusion criteria, included studies, and methodological quality assessment, is detailed in Appendix 4, and a summary table of evidence is provided in Appendix 5. Figure 1 describes the process of this section.

2.5. Consensus

Two separate Delphi panels were convened: one comprising 203 ophthal-

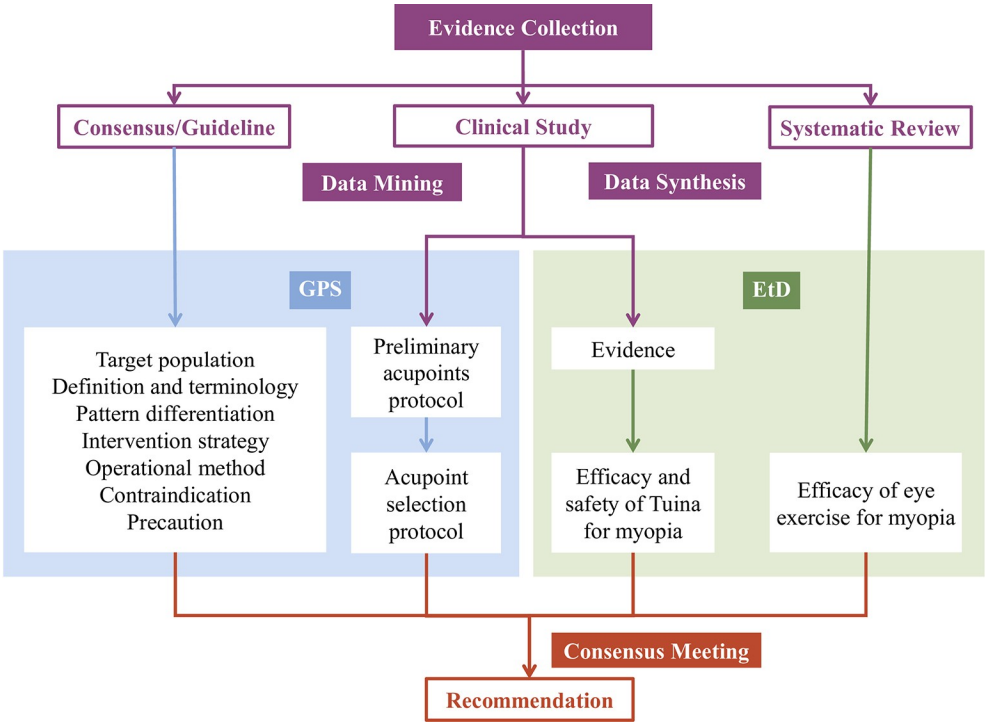

Figure 1 Evidence integration framework for developing recommendations on pediatric myopia management using Tuina

Notes: EtD: evidence to decision; GPS: Good Practice Statement.

mologists, including 183 with associate senior titles or above and the other 76 Tuina specialists. Ophthalmology experts participated in the Delphi process to identify TCM pattern classifications and definitions of prevention first of pediatric myopia. Tuina specialists contributed to the foundational protocol for acupoint selection, pattern-specific acupoint protocols for clinical use, and home-based Tuina programs for patients.

Recommendations, termed Good Practice Statement (GPS), were developed based on professional clinical experience in areas lacking evidence. For questions supported by clinical data, recommendations were formulated using the EtD approach. Expert consensus opinions were generated using the nominal group technique, with consensus defined as ≥60%.

2.6. Validity and dissemination

The draft document underwent both internal and external review. To ensure clarity, relevance, practicality, and precision, primary researchers refined the wording, consolidated overlapping elements, and enhanced descriptions. Technical recommendations should be disseminated locally while accounting for cross-cultural and contextual differences, given the diverse demographics of specialists and the varying adoption of Tuina therapy.

3. Results

Twelve recommendations were finalized: three using the EtD approach and nine using the GPS method, based on 11 clinical questions (Table 1).

Table 1 Summary of recommendations

Clinical question	Recommendation (level of evidence, grade of recommendation)	Method
How should the stages of myopia prevention and treatment be defined based on the concept of "Zhi Wei Bing" (prevention first)?	Recommendation 1: The stage of pediatric myopia termed "prevention before illness" refers to preventing myopia in children and adolescents aged ≤18 years who have normal vision, are in the pre-myopia stage, or have pseudomyopia, thereby reducing the risk of progression to true myopia. Recommendation 2: The stage of pediatric myopia termed "prevention of progression" refers to preventing further progression in children and adolescents aged ≤18 years with true myopia, with the aim of delaying progression or preventing transition from low to high or pathological myopia.	GPS
What are the different patterns of myopia?	Recommendation 3: Myopia patterns in children and adolescents include lowered function of the liver and kidney, yang deficiency, qi and blood deficiency, spleen-qi deficiency, and qi stagnation with blood stasis.	GPS
What intervention strategies are used in Tuina for the prevention and treatment of myopia?	Recommendation 4: Early intervention should be initiated upon detection of reduced vision. Excessive eye strain should be avoided during Tuina treatment. Recommendation 5: To prevent and treat myopia, a combined strategy using both foundational and pattern-differentiation acupoint selection protocols is recommended. The foundational protocol is used for prevention, while the treatment protocol builds upon it with additional acupoints. At all stages, acupoint selection should be guided by pattern differentiation, followed by the corresponding Tuina techniques.	GPS
What acupoint selection protocols are used in Tuina for the prevention and treatment of myopia, based on the intervention strategy?	Recommendation 6: In the "prevention before illness" stage, the intervention is primarily based on periocular and craniocervical acupoints. In the "prevention of progression" stage, specific acupoints on the extremities and back are added. Throughout both phases, acupoint selection should be modified according to pattern differentiation, followed by the corresponding Tuina manipulations.	GPS
How should Tuina treatment be performed for individuals without identifiable patterns?	Recommendation 7: If no pattern can be identified, practitioners should use only the basic treatment protocol.	GPS
Can eye exercises be used as part of a home program for prevention and treatment?	Recommendation 8: Eye exercises can be used to prevent and treat myopia.	GPS
What is the target population for Tuina treatment and prevention of myopia? What are the contraindications, operational methods, and precautions?	Recommendation 9: This therapy is intended for children and adolescents under 18 years of age diagnosed with any of the following: insufficient physiological hyperopic reserve, pre-myopia, pseudomyopia, or low- to high-degree myopia. Tuina is contraindicated in individuals with infectious diseases, bleeding disorders, skin lesions, severe ocular conditions (e.g., glaucoma), or mental disorders that hinder cooperation during treatment. Manipulations should be performed gently and with precision, including forehead pushing, periorbital circular kneading, and thumb pressure on acupoints of the extremities and back, while avoiding direct pressure on the eyeball or carotid artery. Practitioners are advised to maintain hand hygiene, ensure the integrity of the skin at treatment sites, and avoid administering Tuina immediately after meals or on an empty stomach.	GPS
How safe is Tuina for the prevention and treatment of myopia?	Recommendation 10: Tuina therapy can be safely used to prevent and treat mild myopia and pseudomyopia in children, with minimal adverse effects (C-level evidence, strong recommendation).	EtD
How effective is Tuina in preventing and treating myopia?	Recommendation 11: **Tuina combined with other therapies versus other therapies** In the prevention stage, compared with other therapies, the combination of Tuina and other therapies increases the overall effectiveness (B-level evidence, weak recommendation), reduces the incidence of myopia (C-level evidence, weak recommendation), controls the progression of refractive error (D-level evidence, weak recommendation) and axial length (D-level evidence, weak recommendation), improves the amplitude of lens accommodation (C-level evidence, weak recommendation), and improves uncorrected visual acuity (C-level evidence, weak recommendation). In the treatment stage, the combination of Tuina and other therapies increases the overall effectiveness (B-level evidence, weak recommendation). **Tuina compared with other therapies** In the prevention stage, compared with other therapies, Tuina alone increases the overall effectiveness (C-level evidence, weak recommendation), improves uncorrected visual acuity (C-level evidence, weak recommendation), and controls the progression of refractive error (D-level evidence, weak recommendation). In the treatment stage, Tuina alone improves lens accommodation sensitivity (C-level evidence, weak recommendation).	EtD
Can eye exercises prevent or treat myopia?	Recommendation 12: Regular performance of standardized eye exercises can reduce the risk of myopia (C-level evidence, strong recommendation).	EtD

Notes: EtD: evidence to decision; GPS: Good Practice Statement.

3.1. Clinical question: How should the stages of myopia prevention and treatment be defined based on the concept of "Zhi Wei Bing" (prevention first)?

3.1.1. Recommendation 1

The stage of pediatric myopia termed "prevention before illness" refers to preventing myopia in children and adolescents aged ≤18 years who have normal vision, are in the pre-myopia stage, or have pseudomyopia, thereby reducing the risk of progression to true myopia.

3.1.2. Evidence description

The concept of "prevention before illness" in relation to myopia is described in accordance with the relevant guidelines.[17-19] Children gradually lose their hypermetropic reserve with increasing age, transitioning from hypermetropia to emmetropia and eventually to myopia. Children in the pre-myopia stage or with pseudomyopia exhibit reduced accommodative function, accelerated axial length growth, and diminished hypermetropic reserves compared with those of children with normal vision. These children exhibit a high risk of developing myopia when exposed to high-risk factors such as parental myopia, intensive near work, and insufficient outdoor activity. True myopia and pseudomyopia can be prevented by combining optometric techniques to maintain visual function with behavioral interventions. Of the 183 experts in the Delphi poll, 174 (95.1%) reached consensus, and all experts at the consensus meeting achieved 100% agreement.

3.1.3. Recommendation 2

The stage of pediatric myopia termed "prevention of progression" refers to preventing further progression in children and adolescents aged ≤18 years with true myopia, aiming to delay progression or prevent transition from low to high or pathological myopia.

3.1.4. Evidence description

The concept of "prevention of progression" in relation to myopia is described in accordance with the relevant guidelines.[17-19] As of 2026, no curative therapies exist for myopia, and refractive error in affected children worsens annually to varying degrees. Children are at risk of developing high myopia if they present with early-onset myopia, steep corneal curvature, a high axial length/corneal curvature radius ratio, rapid annual axial length growth, or progression exceeding 0.75 diopters per year. Tuina therapy, combined with health education and appropriate visual behavior, can help slow progression from low to high myopia and mitigate worsening refractive error. Of the 183 experts in the Delphi poll, 173 (94.5%) reached consensus, and all eight experts at the consensus meeting achieved 100% unanimity.

3.2. Clinical question: What are the different patterns of myopia?

3.2.1. Recommendation 3

Myopia patterns in children and adolescents include lowered function of the liver and kidney, yang deficiency, qi and blood deficiency, spleen-qi deficiency, and qi stagnation with blood stasis. The pattern differentiation basis refers to the clinical practice guideline of integrative Chinese and Western medicine for myopia in children.[18]

- Lowered function of the liver and kidney: Clear near vision and blurred distant vision, accompanied by general weakness, night sweats, night terrors, frequent urination, hyperactivity, and irritability, are observed. The tongue is pale, and the pulse is weak.
- Yang deficiency: Clear near vision, blurred distant vision, accompanied by pale complexion, palpitations, fatigue, forgetfulness, frequent dreams, depression, and irritability, are observed. The tongue is pale, swollen, or dark purple, with a white, slippery coating. The pulse is weak, thready, slow, or intermittent.
- Qi and blood deficiency: Clear near vision and blurred distant vision, accompanied by dizziness, insomnia, shortness of breath, fatigue, and a lack of energy, are observed. The tongue is pale with a white coating, and the pulse is thready and weak.
- Spleen-qi deficiency: Clear near vision, blurred distant vision, visual fatigue, and preference for closing eyes often post-illness, accompanied by poor appetite and extremity fatigue, are observed. The tongue is pale red with a thin white coating, and the pulse is weak.
- Qi stagnation with blood stasis: Clear near vision, blurred distant vision, accompanied by eye pain and dryness after prolonged viewing, dark eye sockets, eyebrow ridge pain, emotional distress, dizziness, tinnitus, and visual fatigue, are observed. The tongue is dark, and the pulse is string-like or rough.

3.2.2. Evidence description

The top 10% of pattern types in myopia-related literature were selected as candidates. A guideline and Delphi survey established pattern categories and identification criteria,[18] with ≥60% consensus as the threshold. Literature reported potential patterns, including yang deficiency, qi and blood deficiency, lowered function of the liver and kidney, kidney-yang deficiency, spleen dampness stagnation, spleen-qi insufficiency, and essence and blood deficiency. The Delphi survey confirmed lowered function of the liver and kidney, yang deficiency, qi and blood deficiency, and spleen-qi deficiency. Expert consensus and prior guideline supported adding qi stagnation with blood stasis.[15]

3.3. Clinical question: What intervention strategies are used in Tuina for the prevention and treatment of myopia?

3.3.1. Recommendation 4

Early intervention should be initiated upon detection of reduced vision. Excessive eye strain should be avoided during Tuina treatment.

3.3.2. Evidence description

Children aged <18 years with pseudomyopia respond better to treatment at younger ages and with lower degrees of myopia. To optimize Tuina's effectiveness and improve vision, patients should actively cooperate during treatment and minimize eye strain. In the Delphi survey, all 76 experts (100%) reached consensus, and all 33 experts at the consensus meeting achieved 100% agreement.

3.3.3. Recommendation 5

To prevent and treat myopia with Tuina, a combined strategy using both foundational and pattern-differentiation acupoint protocols is recommended. The foundational protocol is used for prevention, whereas the treatment protocol builds upon it and is augmented with additional acupoints. At all stages, acupoint selection must be guided by pattern differentiation, followed by application of the corresponding Tuina techniques.

3.3.4. Evidence description

The "prevention of progression" protocol is more intricate than the "prevention before illness" protocol, incorporating more specific acupoints, stronger manual stimulation, more frequent sessions, and longer treatment periods. Of the 76 experts in the Delphi consensus poll, 98.7% (75/76) reached agreement. Practitioners can apply the same pattern classification approach across all Zhi Wei Bing (prevention first) phases. Of the 76 experts in the Delphi consensus poll, 97.3% (74/76) reached agreement. All 41 experts at the consensus meeting achieved 100% agreement. A strategy combining foundational and pattern-differentiation acupoint selection should be employed to prevent or alleviate myopia.

3.4. Clinical question: What acupoint selection protocols are used in Tuina for the prevention and treatment of myopia, based on the intervention strategy?

3.4.1. Recommendation 6

In the "prevention before illness" stage, the intervention is primarily based

on periocular and craniocervical acupoints. In the "prevention of progression" stage, specific acupoints on the extremities and back are added. Throughout both phases, acupoint selection should be modified according to pattern differentiation, followed by the corresponding Tuina manipulations.

3.4.2. Evidence description

The top 20% of acupoints reported in Tuina literature for myopia were selected as primary candidates, while the next 40% were secondary candidates.[16] Experts were invited to recommend additional acupoints. Fundamental acupoint selection strategies achieved an 85% consensus rate. Acupoints identified in the literature and recommended by experts were chosen as the primary choices for acupoint selection based on pattern-differentiation protocols, with flexibility for additional expert input. Consensus was defined as ≥ 85%. The basic protocol identified 14 acupoints, with consensus rates ranging from 85.33% to 98.67%. The "prevention of progression" protocol identified 21 acupoints, with consensus rates ranging from 85.33% to 100%. The pattern-differentiation protocol identified another 25 acupoints, with consensus rates ranging from 85.14% to 100%.

3.5. Clinical question: How should Tuina treatment be performed for individuals without identifiable patterns?

3.5.1. Recommendation 7

If no pattern can be identified, practitioners should use only the basic treatment protocol.

3.5.2. Evidence description

In cases where no pattern can be identified, only the basic treatment protocol should be applied. All 76 experts in the Delphi consensus poll agreed, and all 33 experts at the consensus meeting achieved 100% consensus.

3.6. Clinical question: Can eye exercises be used as part of a home program for prevention and treatment?

3.6.1. Recommendation 8

Eye exercises can be used to prevent and treat myopia.

3.6.2. Evidence description

Children are advised to perform eye exercises correctly and consistently at least twice daily to delay the onset of myopia.[11] Experts agreed that eye exercises are valuable tools for prevention and treatment, particularly for children unable to access Tuina therapy in hospitals due to limited availability. All 76 experts in the Delphi survey (100%) reached consensus, and all 33 experts at the consensus meeting achieved 100% agreement.

The updated Eye Health Exercises program continues to be recommended as a home-based preventive and therapeutic regimen.

3.7. Clinical question: What is the target population for Tuina treatment and prevention of myopia? What are the contraindications, operational methods, and precautions?

3.7.1. Recommendation 9

This therapy is intended for children and adolescents under 18 years of age diagnosed with any of the following: insufficient physiological hyperopic reserve, pre-myopia, pseudomyopia, or low- to high-degree myopia. Tuina is contraindicated in individuals with infectious diseases, bleeding disorders, skin lesions, severe ocular conditions (e.g., glaucoma), or mental disorders that hinder cooperation during treatment. Manipulations should be performed gently and with precision, including forehead pushing, periorbital circular kneading, and thumb pressure on acupoints of the extremities and back, while avoiding direct pressure on the eyeball or carotid artery. Practitioners are advised to maintain hand hygiene, ensure the integrity of the skin at treatment sites, and avoid administering Tuina immediately after meals or on an empty stomach.

3.7.2. Evidence description

The evidence is based on previous guidelines and expert experience.[18] All 76 experts in the Delphi survey (100%) reached consensus, and all 33 experts at the consensus meeting achieved 100% agreement.

3.8. Clinical question: How safe is Tuina for the prevention and treatment of myopia?

3.8.1. Recommendation 10

Tuina therapy can be safely used to prevent and treat mild myopia and pseudomyopia in children, with minimal adverse effects (C-level evidence, strong recommendation).

3.8.2. Evidence description

Tuina for pseudomyopia and simple low myopia did not cause any negative side effects in three RCTs.[20-22]

3.9. Clinical question: How effective is Tuina in preventing and treating myopia?

3.9.1. Recommendation 11

Tuina combined with other therapies versus other therapies: In the prevention stage, compared with other therapies, the combination of Tuina and other therapies increases the overall effectiveness (B-level evidence, weak recommendation), reduces the incidence of myopia (C-level evidence, weak recommendation), controls the progression of refractive error (D-level evidence, weak recommendation) and axial length (D-level evidence, weak recommendation), improves the amplitude of lens accommodation (C-level evidence, weak recommendation), and improves uncorrected visual acuity (C-level evidence, weak recommendation). In the treatment stage, the combination of Tuina and other therapies increases the overall effectiveness (B-level evidence, weak recommendation).

Tuina compared with other therapies: In the prevention stage, compared with other therapies, Tuina alone increases the overall effectiveness (C-level evidence, weak recommendation), improves uncorrected visual acuity (C-level evidence, weak recommendation), and controls the progression of refractive error (D-level evidence, weak recommendation). In the treatment stage, Tuina also improves lens accommodation sensitivity (C-level evidence, weak recommendation).

3.9.2. Evidence description

Most studies showed that Tuina is more effective when combined with other therapies than when used alone. In the preventive stage, a meta-analysis of four RCTs[23-26] demonstrated that combination therapy had a higher overall effectiveness than that of other therapies alone (risk ratio [RR]: 1.23, 95% CI: 1.13–1.34). One RCT[27] reported reduced myopia incidence in the fifth year (RR: 0.46, 95% CI: 0.21–0.98); however, no significant change was observed in the third (RR: 0.21, 95% CI: 0.01–4.21), fourth (RR: 0.34, 95% CI: 0.07–1.64), and sixth years (RR: 0.74, 95% CI: 0.44–1.24).

Combination therapy improved diopters (mean difference [MD]: 0.75, 95% CI: 0.51–0.99),[27] increased lens accommodation amplitude (MD: 1.87, 95% CI: 0.56–3.18),[28] and enhanced uncorrected visual acuity (MD: 0.10, 95% CI: 0.01–0.19)[26] compared with other therapies alone. However, a meta-analysis of two RCTs[27,28] found no significant difference in axial length improvement between combination therapy and other therapies alone (MD: −1.60, 95% CI: −4.50–1.30). In the treatment stage, a meta-analysis of five RCTs[20,29-33] showed that combination therapy had a higher overall effectiveness than that of individual therapies (RR: 1.17, 95% CI: 1.09–1.26).

Tuina was found to be more beneficial than other therapies in most trials. In the prevention stage, a meta-analysis of two RCTs[33,34] demonstrated that Tuina increased the overall effectiveness compared with other interventions

(RR: 1.27, 95% CI: 1.12–1.44) and enhanced uncorrected visual acuity compared with other therapies (MD: 0.07, 95% CI: 0.04–0.11). However, Tuina and other treatments did not differ significantly in refractive error improvement (MD: 0.04, 95% CI: −0.45–0.53).[33,34] In terms of treatment, a meta-analysis of two RCTs[35,36] revealed no significant difference between Tuina and other therapies in improving lens accommodation sensitivity (MD: 0.61, 95% CI: −2.37–3.60).

3.10. Clinical question: Can eye exercises prevent or treat myopia?

3.10.1. Recommendation 12

Regular performance of standardized eye exercises can reduce the risk of myopia (C-level evidence, strong recommendation).

3.10.2. Evidence description

A meta-analysis[11] found that children who performed eye exercises were less likely to develop myopia compared with those who did not (OR: 0.79, 95% CI: 0.71–0.89). Subgroup analysis based on exercise frequency (unspecified, once daily, or twice or more daily) showed no significant difference in the once-daily subgroup, while results remained consistent across other subgroups. Regular or persistent eye exercise was a protective factor against myopia (OR: 0.75, 95% CI: 0.69–0.81). A serious approach to eye exercises was associated with lower myopia risk compared with a casual or careless approach (OR: 0.47, 95% CI: 0.40–0.55). Correct, standardized performance of eye exercises reduced myopia risk compared with the risk associated with incorrect, non-standardized performance (OR: 0.86, 95% CI: 0.76–0.97). Factors such as recognition of acupoints, performing exercises outside school hours, exercise speed, and whether exercises were taught by professionals were not significantly associated with myopia occurrence.

4. Tuina protocol for myopia in children

4.1. Target person

This therapy is intended for children and adolescents under 18 years of age diagnosed with any of the following: insufficient physiological hyperopic reserve, pre-myopia, pseudomyopia, or low- to high-degree myopia.

4.2. Contraindications

Absolute contraindications include patients with notifiable infectious diseases (as defined by the *Law of the People's Republic of China on Prevention and Control of Infectious Diseases*),[37] bleeding disorders (e.g., thrombocytopenic purpura, hemophilia), fractures, infections, tumors, skin damage, or allergic reactions at treatment sites. Other contraindications include unexplained crying or lethargy, severe ocular diseases (e.g., glaucoma, cataracts), critical or emergency conditions, and mental disorders that prevent cooperation with treatment.

Relative contraindications include individuals with acute ocular inflammation (e.g., keratitis, conjunctivitis) that must be controlled before therapy, or those with controlled primary lesions such as skin disorders, skin injury, or unexplained lumps near treatment sites.

4.3. Acupoint selection protocol for prevention and treatment

4.3.1. Medical institutional Tuina protocol

The foundational Tuina protocol for myopia, encompassing both the "prevention before illness" and "prevention of progression" stages, along with the pattern-differentiation acupoint selection protocol, is detailed in Table 2.

Acupoints and operation:

- Acupoints on the forehead (Tianmen)**:** Alternating linear pushing motions along the midline from the glabella (midpoint between the eyebrows) to the anterior hairline using the radial sides or fingertips of both thumbs.
- Acupoints around the eyebrow (Kangong): Push along the eyebrow arch from the medial to the lateral end of each eyebrow with thumbs; remaining fingers rest on the temporal region.
- Acupoints on the head (Taiyang [EX-HN5], Jingming [BL1], Cuanzhu [BL2], Yuyao [EX-HN4], Yangbai [GB14], Sizhukong [TE23], Tongziliao [GB1], Sibai [ST2], Chengqi [ST1], Qiuhou [EX-HN7], Zhengguang, Shenting [GV24], Baihui [GV20]): Knead with the pulp of the thumb or middle finger, followed by a horizontal "∞-shaped" motion around the orbital rim for 2 min using the thenar eminence.
- Acupoints on the neck (Fengchi [GB20], Yiming [EX-HN14])**:** Knead with the pulp of the thumb or middle finger.
- Acupoints on the shoulder (Jianjing [GB21]): Grip the trapezius muscle with the thumb positioned posteriorly and fingers positioned anterior, lift, twist, knead, and release slowly.
- Acupoints on the trunk and extremities (Jueyinshu [BL14], Xinshu [BL15], Geshu [BL17], Ganshu [BL18], Pishu [BL20], Weishu [BL21], Shenshu [BL23], Mingmen [GV4], Zhongwan [CV12], Hegu [LI4], Yanglao [SI6], Shenmen [HT7], Neiguan [PC6], Zusanli [ST36], Xuehai [SP10], Sanyinjiao [SP6], Taichong [LR3], Taixi [KI3], Guangming [GB37]): Knead with the tip of the thumb.

Technical requirements: Techniques should be gentle, smooth, and steady,

Table 2 Acupoint selection protocol for prevention and treatment of pediatric myopia

Protocol	Acupoint selection
Prevention before illness (foundational protocol 1)	Head: Tianmen, Kangong, Taiyang (EX-HN5), Jingming (BL1), Cuanzhu (BL2), Yuyao (EX-HN4), Yangbai (GB14), Sizhukong (TE23), Tongziliao (GB1), Sibai (ST2), Chengqi (ST1) Neck: Fengchi (GB20), Yiming (EX-HN14) Extremities: Guangming (GB37)
Prevention of progression (foundational protocol 2)	Additional acupoints added to the foundational protocol 1: Head: Qiuhou (EX-HN7), Zhengguang, Shenting (GV24), Baihui (GV20) Neck: Jianjing (GB21) Extremities: Yanglao (SI6), Hegu (LI4)
Pattern differentiation	Additional acupoints added to the above two protocols: Lowered function of the liver and kidney: Ganshu (BL18), Shenshu (BL23), Mingmen (GV4), Sanyinjiao (SP6), Taichong (LR3), Taixi (KI3) Yang deficiency: Jueyinshu (BL14), Xinshu (BL15), Geshu (BL17), Yanglao (SI6), Shenmen (HT7), Neiguan (PC6) Qi and blood deficiency: Pishu (BL20), Zhongwan (CV12), Zusanli (ST36), Sanyinjiao (SP6) Spleen-qi deficiency: Pishu (BL20), Weishu (BL21), Zhongwan (CV12), Zusanli (ST36), Sanyinjiao (SP6) Qi stagnation with blood stasis: Geshu (BL17), Hegu (LI4), Taichong (LR3), Xuehai (SP10)

Notes: Specific acupoint localization of pediatric Tuina can be referenced in the guideline "Development of International Guidelines by Tuina Practitioners for Specific Acupoints of Pediatrics Tuina (2022 version)."[38] The names of acupoints are derived from the National Standard of the People's Republic of China: "nomenclature and location of meridian points,"[39] and "nomenclature and location of extra points in common use."[40]

with intensity tolerable to the patient. The patient should experience the sensation of "qi arrival" at the acupoints. Each acupoint should be stimulated for 30 s to 1 min at a frequency of 100–120 motions per minute. Treatment should begin with the head and neck, followed by the trunk, and finally the extremities.

4.3.2. Home-based Tuina protocol for myopia in children

Preparing for the operation: Ensure a quiet, comfortable, and clean environment. Wash hands thoroughly and trim nails. The child should sit upright in a neutral position, avoiding excessive tilting or leaning forward.

Acupoints and operation: The acupoints were BL2, BL1, ST2, EX-HN5, and GB20. The manipulation procedures followed the Sixth Set of Eye Exercises for primary and secondary school students.

- Knead BL2 with the pulp of the thumb while the remaining four fingers rest against the forehead. Perform one kneading circle per beat.
- Press BL1 with the pulp of the index finger while the remaining fingers form a fist. Perform one up-and-down press per beat.
- Knead ST2 with the pulp of the index finger while the thumb rests against the mandible. Perform one kneading circle per beat.
- Knead EX-HN5 with the pulp of the thumb, performing one kneading circle per beat. After every four kneading circles, use the interphalangeal joint of the index finger to scrape from the medial to the lateral end of the eyebrow (once every two beats).
- Knead GB20 with the pulp of the index and middle fingers while tilting the head slightly forward. Perform one press per beat.
- Pinch the earlobe with the thumb and index finger while simultaneously grasping the floor with the toes. Perform one complete motion per beat.

Technical requirements: The core principles of eye exercises are accuracy, sufficient time, sufficient quantity, and persistence. Acupoints must be located precisely, with pressure sufficient to cause mild soreness or distension without skin damage. Each acupoint should be stimulated for four eight-beat cycles. Exercises should be performed two to three times daily.[13]

4.4. Course of treatment

Both home-based and institutional protocols involve 4–5 sessions per week for 4 weeks, with a minimum of four treatment cycles. The frequency and duration are the same for both approaches. A 1-week rest period should be scheduled between courses, and the number of courses may be increased depending on the severity of the condition.

4.5. Precautions

Healthcare professionals should ensure that hands and nails are clean and well-trimmed. The integrity of the skin at the treatment site should be examined before therapy. Techniques must be gentle and comfortable, with no pressure applied to the eyeball or carotid artery. Patients should remove makeup before treatment, and therapy should not be performed immediately after eating or on an empty stomach.

4.6. Post-treatment care

It is advisable to stay warm, drink some water, avoid eye strain and strenuous exercise after therapy.

4.7. Adverse events and management

Patients allergic to Tuina mediums should discontinue therapy immediately. Excessive force may lead to subcutaneous capillary bleeding. Mild cases typically resolve spontaneously without intervention. For significant ecchymosis, warm compresses or topical hematoma-resolving agents may be applied 48 h post-onset. If ocular injury occurs, an ophthalmologist should be consulted without delay. Accurate acupoint placement, gentle technique, and prompt communication of patient feedback are essential. Mild discomfort and temporary skin congestion are common side effects. Treatment should be stopped immediately in case of significant discomfort or redness.

4.8. Daily care

Comprehensive management includes attention to living environment, visual hygiene, outdoor activities, and other lifestyle factors. These guidelines also provide recommendations for future research.[13,18]

5. Discussion

In the realm of disease prevention and treatment, the concept of "Zhi Wei Bing" (prevention first) typically includes three aspects: prevention before illness, prevention of progression, and prevention of recurrence. This study addresses the concepts of "prevention before illness" and "prevention of progression." Clinical pre-myopia and pseudomyopia are considered reversible forms of myopia when addressed with timely intervention and, thus, fall under "prevention before illness." Conversely, low and high myopia are classified under "prevention of progression" owing to their irreversible nature. The term "cure" refers to complete resolution of symptoms, restoration of physiological function, and elimination of the underlying cause. At present, no effective cure for myopia exists. Current management focuses on preventing onset and regulating progression once the condition develops. Refractive surgery, while correcting refractive error, is not considered curative because it cannot prevent postoperative axial elongation, particularly in adolescents, nor does it eliminate the risk of fundus complications associated with excessive axial length. In 2019, the State Council issued the Opinions on Implementing the Healthy China Initiative, which further articulated a commitment to the principle of "prevention first and early intervention."[41] Increasing attention has been given to early intervention for symptoms or potential diseases.[42] Previous guidelines have also emphasized prevention and control. The guideline categorizes prevention of pre-myopia and pseudomyopia as "prevention before illness," and delaying progression of low myopia to high myopia as "prevention of progression,"[18] consistent with the results of this study. The guideline identifies the target population as children and adolescents under 18 years diagnosed with insufficient physiological hyperopic reserve, premyopia, or low myopia.[13] Another study describes four stages: prevention, early intervention, prompt treatment, and post-illness care, focusing on adolescents with regulatory myopia.[17] Together, these guidelines and expert consensus discussions form a conceptual framework for "prevention first."

In terms of intervention strategies, given the high incidence of myopia and the importance of early intervention, medical practitioners, child health workers, children, and parents should be provided with institutional and home-based programs. Home-based medical care, as an extension of traditional medical care, plays a unique role in "prevention before illness" and "prevention of progression": The institutional program emphasizes professionalism and standardization, while the home-based program prioritizes safety, simplicity, and feasibility. The key difference between the two programs is the balance between precision, effectiveness, safety, and accessibility.

Both programs share common acupoints, including BL2, ST2, EX-HN5, BL1, and GB20, all located around the eyes or cervical region. These acupoints are generally safe, improve ocular blood circulation, and relieve visual fatigue. The institutional program includes additional acupoints such as EX-HN7, Zhengguang, GB21, and specific back-*Shu* acupoints, requiring precise localization and standardized technique, necessitating practitioners with strong anatomical knowledge and operational skills. The home-based program incorporates simpler points, such as auricular points for the eye and Governor Vessel circulation areas, which are easier to locate and pose lower risk, aligning with the principle of gentle intervention in "prevention first."

The institutional program combined foundational acupoint selection with pattern differentiation. Inclusion and exclusion criteria were determined using the "population, intervention, comparison, and outcome" (PICO) principle. A systematic search of mainstream databases was conducted, followed by data mining to identify acupoint characteristics and patterns. Pattern differentiation protocols were developed through systematic review of guidelines and clinical literature and then refined through expert consensus.

Recommendations were primarily developed using the GPS method, based on expert experience, while the EtD method, which is based on evi-

dence, was used less frequently. This is owing to limited high-quality clinical studies on myopia in children, making it challenging to obtain direct evidence for some clinical questions. Issues such as pattern classification and acupoint selection are highly characteristic of TCM and rely heavily on expert judgment, making the GPS method more appropriate.

This program established a standardized, multidimensional, interdisciplinary, and innovative intervention system for myopia prevention and control tailored to China's national context. As the first technical guideline in China based on data mining and expert consensus, it provides quantitative analysis of key acupoints such as BL1 and BL2. It also standardizes technique intensity and operation duration, addressing a critical gap in clinical practice. The program innovatively integrates a multi-dimensional linkage system of "medicine, home, school, and community." Homes and schools provide safe, accessible Tuina programs, while clinical institutions deliver personalized treatment. This approach expands beyond conventional institutional boundaries, improving compliance and sustainability of intervention measures. The consensus-development group included interdisciplinary experts from TCM, Western medicine, ophthalmology, acupuncture and Tuina, pediatrics, and related fields. Through multiple rounds of deliberation and refinement, technical guidelines were crafted to align with evidence-based medicine and ensure clinical feasibility. By integrating traditional Tuina techniques into the modern medical framework, this program advances myopia prevention and control. It represents a beneficial combination of traditional therapies with modern diagnostic and treatment approaches and serves as a case study for the modernization of traditional Chinese medical therapies.

This study has some limitations. Despite numerous GPS, original research evidence remains limited. Expert consensus opinions, informed by available information, help mitigate these gaps to some extent. However, concerns remain regarding cost-effectiveness and patient preferences. It should also be noted that evidence retrieval and synthesis in this study were conducted only up to 2023. Subsequent studies have since been published, and future research should update the evidence base accordingly. Consensus experts were limited to domestic participants, and local cultural characteristics must be considered during implementation and promotion. The geographical distribution and multidisciplinary expertise of the panel reflect China's regional characteristics to some extent. To focus on the characteristics of Tuina techniques, complex conditions such as pathological eye diseases and comorbidities were excluded. This study, therefore, concentrated on populations for whom Tuina is likely to be safe and effective. Evidence suggests that Tuina plays a relatively marginal role in complex conditions.

6. Conclusion

Technical guidelines were developed following a standardized process. Through expert interviews, literature research, Delphi questionnaires, and consensus meetings, the guidelines integrated evidence from multiple sources with the expertise of specialists. They emphasize the principle of "prevention first" and highlight the role of Tuina in preventing and treating pediatric myopia. The guidelines address target populations, pattern classifications, Tuina therapy design principles, and specific prevention and treatment protocols, providing comprehensive and standardized guidance for pediatric myopia management. In practice, continuous refinement, validation, and improvement of Tuina programs are necessary to safeguard children's visual health. Future work should include high-quality clinical trials of Tuina therapy for pediatric myopia to strengthen the evidence base, focusing on efficacy, safety, cost-effectiveness, and patient preferences. Research should also evaluate Tuina's effectiveness and safety across different subgroups (e.g., sex, age, and constitution) and examine factors influencing efficacy, such as standardization of procedures, accuracy of acupoint localization, and variations in treatment duration, frequency, and course. Long-term clinical trials are needed to assess Tuina's preventive effects and sustained efficacy in children.

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Data Availability

All data supporting the findings of this study are available within the article and its Electronic Supplementary Material.

Author Contribution Statement

Yi Liang: Data curation, investigation, formal analysis, visualization, and writing – original draft. **Chang-he Yu:** Conceptualization, writing – original draft, methodology, formal analysis, and writing – review & editing. **Xiao-xue Lan:** Data curation, investigation, formal analysis, and writing – review & editing. **Mo Yang:** Methodology, formal analysis, and writing – review & editing. **Yuan-wen Liang:** Investigation, data curation, validation, and writing – review & editing. **Cheng-kang Ye:** Investigation, data curation, validation, and writing – review & editing. **Hui Shao:** Investigation, data curation, validation, and writing – review & editing. **Ya-nan Sun:** Investigation, data curation, formal analysis, and writing – review & editing. **Miao Jiang:** Validation and writing – review & editing. **Qiang He:** Validation and writing – review & editing. **Li Sun:** Validation and writing – review & editing. **Si-yu Long:** Validation and writing – review & editing. **Xi-you Wang:** Validation and writing – review & editing. **Zhi-wen Weng:** Investigation and visualization. **Hong Chen:** Conceptualization, funding acquisition, supervision, and writing – review & editing. **Ying Wang:** Conceptualization, methodology, supervision, and writing – review & editing.

Use of AI Statement

None.

Declaration of Competing Interest

The authors have no competing interests to declare that are relevant to the content of this article.

Electronic Supplementary Material

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