Acupuncture for slowing the progression of myopia in children and adolescents (Review)

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[Intervention Review]

Acupuncture for slowing the progression of myopia in children and adolescents

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ABSTRACT

Background

Myopia (near-sightedness or short-sightedness) is one of the three commonly detected refractive (focusing) errors. Acupuncture is the stimulation of acupuncture points by various methods including needle insertion and acupressure. It is often used by traditional Chinese medicine practitioners to treat myopia in children.

Objectives

To assess the effectiveness and safety of acupuncture in slowing the progression of myopia in children and adolescents.

Search methods

We searched CENTRAL (which contains the Cochrane Eyes and Vision Group Trials Register) (The Cochrane Library 2011, Issue 7), MEDLINE (January 1950 to July 2011), EMBASE (January 1980 to July 2011), the Allied and Complementary Medicine Database (AMED) (January 1985 to July 2011), Latin American and Caribbean Health Sciences Literature Database (LILACS) (January 1982 to July 2011), the metaRegister of Controlled Trials (mRCT) (www.controlled-trials.com), ClinicalTrials.gov (www.clinicaltrial.gov), the National Center for Complementary and Alternative Medicine (NCCAM) (The first issue to August 2010), the Chinese Biological Medicine Database (CBM) (1978 to April 2011), China National Knowledge Infrastructure (CNKI) (1994 to April 2011) and VIP (1989 to April 2011). There were no date or language restrictions in the electronic searches for trials. CENTRAL, MEDLINE, EMBASE, AMED, LILACS, mRCT and ClinicalTrials.gov were last searched on 9 July 2011. NCCAM was searched up to August 2010 and CBM, CNKI, and VIP were last searched on 6 April 2011.

Selection criteria

We included randomized controlled trials (RCTs) that included any type of acupuncture treatment for myopia in children and adolescents.

Data collection and analysis

Two authors independently evaluated the search results according to the inclusion and exclusion criteria. Two authors extracted and assessed data independently. We contacted the study investigator for missing data.
Main results

We included two RCTs conducted in Taiwan with a total of 131 participants. We did not perform a meta-analysis as the trials were assessing different outcomes. Neither trial met our pre-defined primary outcome criteria of myopia progression defined as one diopter mean change. Only one trial reported the changes of axial length without non-significant difference among groups and both trials reported that several children experienced mild pain during acupuncture stimulation.

Authors’ conclusions

Two trials are included in this review but no conclusions can be drawn for the benefit of co-acupressure for slowing progress of myopia in children. Further evidence in the form of RCTs are needed before any recommendations can be made for the use of acupuncture treatment in clinical use. These trials should compare acupuncture to placebo and have large sample sizes. Other types of acupuncture (such as auricular acupuncture) should be explored further as well as compliance with treatment for at least six months or longer. Axial length elongation of the eye should be investigated for at least one year. The potential to reduce/eliminate pain from acupuncture experienced by children should also be reviewed.

Plain Language Summary

Acupuncture for near-sightedness in children

Myopia, also called near-sightedness or short-sightedness, is one of the most commonly occurring eye problems in children and adolescents. Early detection and treatment of initial myopia is associated with better outcomes of visual improvement and correction. Myopia is usually managed by wearing glasses and/or contact lenses. It is common practice for traditional Chinese medicine practitioners to use acupuncture for the treatment of myopia. Acupuncture is the stimulation of acupuncture points by needle insertion, acupressure, surface electrical and laser stimulation. This review aimed to assess the effectiveness and safety of acupuncture in slowing the progression of myopia in children and adolescents. We included two studies conducted in Taiwan with a total of 131 school children and did not combine the results as the two trials assessed different outcomes. One study found no significant difference in changes in the length of the eyes. Both studies found several children experienced mild pain while pressing and dropped out. The included studies in this review were unable to provide evidence of the effect of acupuncture for slowing the progression of myopia. More trials should be conducted where acupuncture is compared to placebo, other types of acupuncture are investigated, compliance with treatment for at least six months is explored and axial length elongation of the eye should be for at least one year.

Background

Description of the condition

Introduction

Myopia (near-sightedness or short-sightedness) is one of the three commonly detected refractive (focusing) errors; the other two being hypermetropia (long-sightedness) and astigmatism. Refractive errors occur when the rays of light entering the eye are not focused correctly onto the retina. In myopia, light rays entering the eye fall in front of the retina and as a result near objects may be seen clearly but objects in the distance appear blurred. This most commonly occurs when the eyeball is too long or the cornea does not properly bend the light rays entering the eye. Myopia often develops at approximately six to eight years of age and progresses through 13 to 16 years (Goss 1987; Lam 1991; Saw 2000; Zhao 2002) or into early adulthood, before starting to stabilize. Myopia is often discovered in school-age children who report having trouble seeing distant objects, for example the chalkboard or whiteboard.

Epidemiology

The prevalence of myopia varies across geographic regions, ethnic origins, cultural settings, age and education level (Ellwein 2002; Negrel 2000), with a greater prevalence in Asia than in other parts of the world (Lin 2004; Zhan 2000). The myopic rate is 0.12% to 3.8% in Africa, 24% to 27.8% in Europe, 30% to 40% in Japan...
Myopia is usually measured in diopters (D) and it is identified by a minus sign in front of the diopter number. It can be classified in varying degrees: mild myopia (0 D to -3.0 D), moderate myopia (-3.0 D to -6.0 D) and high myopia (-6.0 D or more) (Wang 1996). Refractive error can be measured by subjective or objective methods. In children, the diagnosis of myopia is made as follows.

1. A cycloplegic refraction is performed. This is a test which uses cycloplegic dilatation to paralyze accommodation and means that accurate testing can be performed in most young children, even if they are unable to maintain prolonged distance fixation during testing. Retinoscopy is a technique that takes advantage of the eye’s natural optics to help determine refractive error. A retinoscope is shone into the patient’s eye and the ‘cat’s eye’ reflex (that is produced by the retina) is ‘neutralized’ by the examiner using appropriate lens powers. Retinoscopy is necessary to determine accurate refractive error in children, but the technique also allows a quick approximation of refractive error in older children, who then undergo a manifest (subjective) refraction.

2. Visual acuity is rechecked with the correction in place using an age-appropriate vision test. All participants with myopia can achieve best-corrected visual acuity (BCVA) of 20/20 (6/6 or 1.0) or better. Best-corrected vision is visual acuity with the best glasses or contact lens prescription for that person.

3. Any other ocular pathology is excluded by external and internal eye examination.

**Treatment options**

Myopia is usually managed by correction through glasses or contact lenses (using concave lenses). Glasses can provide clear vision with few potential side effects. Contact lenses require greater dexterity and responsibility to care for them than glasses. Both of these conservative optical methods only provide temporary correction of myopia.

Other alternatives available include surgery, drugs and acupuncture. Surgical procedures involve an operation on either the cornea or lens of the eye to reduce the focusing power of the cornea or lens respectively. Keratectasia (ectasia) is the weakening of the cornea’s structural stability, which causes the cornea to bulge forward, resulting in distorted vision, return of myopia and fluctuating vision, etc. Laser surgery can be performed on adults, but it is often not recommended for children as the latter’s eyes are still developing and the myopia continues to change during adolescence. Hu 2004 documented that atropine eye drops of 0.5% to 1% concentration can prevent the progress of myopia, but the drug is limited by its adverse effects such as mydriasis (pupil dilation and blurred vision) and photophobia (light sensitivity).

**Description of the intervention**

Acupuncture is defined as the stimulation of acupuncture points by any method, including needle insertion, acupressure, surface electrical or laser stimulation, etc. The traditional Chinese medicine (TCM) approach of acupuncture is based on the Chinese philosophical ideas of Yin and Yang and the Five Elements (metal, wood, water, fire and earth), meridians, vital substances, pathogenic factors and the eight principle patterns (Beal 1999). It involves inserting fine needles into different parts of the body to correct the imbalance of energy in the body and restore natural internal homeostasis. According to the acupuncture theory, activation of De Qi (“arrival of energy”; a sensation of numbness or tingling which is often generated by stimulating acupuncture needles by hand or with an electrical current) may indicate that acupuncture is exerting its beneficial effects. Western acupuncture uses TCM theory to make a diagnosis and choose acupoints, but uses nerve location to choose stimulation points.

**How the intervention might work**

In China it is not unusual for some TCM practitioners to use acupuncture or acupressure on children with myopia. Acupuncture can sometimes be combined with moxibustion (warming) (Chen 1996), cupping, massage or electro-stimulation. There are various therapeutic approaches and different points can be used in acupuncture treatment for myopia, such as auricular acupuncture (Deng 2003; Wang 1995), acupressure, body acupuncture, electroacupuncture, laser acupuncture or a combination of several of the above approaches (Sheng 1994; Zheng 2003). However, the mechanism of acupuncture therapy for myopia is largely unknown.

**Why it is important to do this review**

It is common for TCM practitioners to use acupuncture for the treatment of myopia in children and adolescents. There have been many studies reporting the results of acupuncture in the treatment of myopia but their results are conflicting. Some clinical studies...
have shown an effect in slowing the progression of myopia at an early stage and/or by a weak degree (Che 1994; Lai 1993; Li 1993; Li 2003; Val’kova 1989; Yin 1990). On the contrary, other studies have found no significant effectiveness (Ostberg 1992; Roy 1980; Wong 1980). It is very important to summarize the current evidence in order to investigate the effectiveness of acupuncture as a treatment for myopia in children and adolescents in both slowing and stopping its progression.

**OBJECTIVES**

To assess the effectiveness and safety of acupuncture in slowing or stopping the progression of myopia in children and adolescents.

**METH ODS**

**Criteria for considering studies for this review**

**Types of studies**

We included randomized controlled trials (RCTs) that met our inclusion criteria.

**Types of participants**

We included trials in which participants were younger than 18 years old and were diagnosed with myopia. The criteria for diagnosis were:

1. cycloplegic refraction to confirm myopia;
2. rechecking of visual acuity with the correction in place using an age-appropriate vision test and achieving normal vision 20/20 (6/6 or 1.0);
3. exclusion of any participants with ocular pathology by external and internal eye examination.

**Types of interventions**

We included trials with the following interventions:

1. acupressure;
2. auricular acupuncture;
3. conventional acupuncture (needle insertion);
4. electroacupuncture;
5. laser acupuncture;
6. eye exercise; and
7. combination of several acupuncture approaches.

We included trials which compared each acupuncture modality with the following controls individually:

1. no intervention or sham acupuncture (sham acupuncture is placebo acupuncture in which needles are inserted in the skin but are not intended to stimulate known acupuncture points);
2. non-specific treatment, such as vitamin E; and
3. glasses.

**Types of outcome measures**

**Primary outcomes**

Myopia progression (defined as one diopter mean change) and the proportion of children/adolescents whose myopia increased by one diopter per year.

**Secondary outcomes**

1. Mean change in axial length measured by any method.
2. Mean change in corneal radius of curvature measured by any method.

We included data from one eye, from each eye individually or the average of both eyes, and planned to pool the results regardless of how the data were analyzed (Walline 2008). If data were not available for each individual eye, we considered data based on the average of both eyes.

The timing of the outcome assessment was as follows:

1. early-term: at three months;
2. middle-term: at six months; and
3. long-term: at one year.

**Adverse outcomes**

We reported and graded any adverse events related to the intervention as:

1. mild, such as minor pain or psychological distress; or
2. severe, such as infection, bleeding or vomiting.

**Economic data**

Any trials detailing the comparative costs of treatment methods were described (cost/benefit analysis).

**Search methods for identification of studies**

**Electronic searches**

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) 2011, Issue 7, part of The Cochrane Library. www.thecochranelibrary.com (accessed 9 July 2011), MEDLINE (January 1950 to July 2011), EMBASE (January 1980 to July 2011), the Allied and Complementary Medicine Database
(AMED) (January 1985 to July 2011), Latin American and Caribbean Health Sciences Literature Database (LILACS) (January 1982 to July 2011), the metaRegister of Controlled Trials (mRCT) (www.controlled-trials.com), ClinicalTrials.gov (www.clinicaltrials.gov), the National Center for Complementary and Alternative Medicine (NCCAM) (The first issue to August 2010), the Chinese Biological Medicine Database (CBM) (1978 to April 6, 2011), China National Knowledge Infrastructure (CNKI) (1994 to April 6, 2011) and VIP (1989 to April 6, 2011). There were no date or language restrictions in the electronic searches for trials. CENTRAL, MEDLINE, EMBASE, AMED, LILACS, mRCT and ClinicalTrials.gov were last searched on 9 July 2011. NCCAM was searched up to August 2010 and CBM, CNKI, and VIP were last searched on 6 April 2011. See: Appendices for details of search strategies for CENTRAL (Appendix 1), MEDLINE (Appendix 2), EMBASE (Appendix 3), AMED, (Appendix 4), LILACS (Appendix 5), mRCT (Appendix 6), ClinicalTrials.gov (Appendix 7), NCCAM (Appendix 8), CBM (Appendix 9), CNKI (Appendix 10) and VIP (Appendix 11).

Searching other resources
We searched the reference lists of the trials included in the review for additional trials and used the Science Citation Index to find studies that had cited the identified trials. We contacted investigators to identify additional published and unpublished studies. We did not actively handsearch optometry literature and abstracts of conference proceedings specifically for this review.

Data collection and analysis

Selection of studies
Two authors independently assessed the titles and abstracts of all RCTs identified according to the inclusion criteria. For those studies published in a language other than English or Chinese, relevant papers were translated with the assistance of the Cochrane Eyes and Vision Group. We classified the abstracts as (a) definitely include, (b) unsure or (c) definitely exclude. We obtained full-text copies of those classified as (a) or (b). Two authors worked independently to determine which studies met the inclusion criteria and classified them as (1) include, (2) awaiting assessment or (3) exclude. We documented the concordance between the authors and the third author resolved any discrepancies. We assessed the included studies for methodological quality (see below). We contacted the authors of the studies classified as (2) for further clarification and reassessed them when more information became available and excluded studies identified by both authors as (3) from the review and documented the reasons.

Data extraction and management
Two authors independently extracted the relevant data for the primary and secondary outcomes on to paper data collection forms developed by the Cochrane Eyes and Vision Group and resolved discrepancies by discussion. We independently checked the data before entering all data into RevMan 5 (RevMan 2011) and extracted data on the study characteristics, which included details of participants, interventions, outcomes, cost and quality of life data, and other relevant information.

Assessment of risk of bias in included studies
We assessed the sources of systematic bias in trials according to the methods described in Chapter 8 of the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2011b) and considered the following parameters.

1. Random sequence generation (selection bias)
A random sequence ensures that each participant has a known, unpredictable and usually equal chance of being assigned to the intervention group. We assessed the allocation sequence generation as follows.
- Low risk of bias: if the allocation sequence was generated by a computer; referred to a random number table; coin tossing; shuffling cards or envelopes; throwing dice; drawing of lots.
- High risk of bias: if a system involving dates, names or admission numbers was used for the allocation of patients. This would also include those studies involving non-random approaches, for example allocation by judgment of the clinician; by preference of the participant; based on the results of a laboratory test or a series of tests; or by availability of the intervention.
- Unclear risk of bias: if the trial was described as randomized, but the allocation sequence generation was insufficient.

2. Allocation concealment (selection bias)
We classified allocation concealment as follows.
- Low risk of bias: if the allocation of patients involved a central independent unit; on-site locked computer; identically appearing numbered containers prepared by an independent investigator; serially numbered, sealed, and opaque envelopes.
- High risk of bias: if the allocation sequence was known by the investigators or participants who could possibly foresee assignments and thus introduce selection bias, such as using an open random allocation schedule (e.g. a list of random numbers); assignment envelopes used without appropriate safeguards (e.g. if envelopes were unsealed or non-opaque or not sequentially numbered); alternation or rotation; date of birth; case record number; any other explicitly uncontrolled procedure.
- Unclear risk of bias: if the trial was described as using allocation concealment, but the method used was not described.
or information was insufficient to permit a judgment of 'low risk of bias' or 'high risk of bias'. For example, if the use of assignment envelopes was described, but it remains unclear whether envelopes were sequentially number, opaque and sealed.

3. Masking (blinding) of outcome assessor (detection bias)

We assessed the procedure used to keep trial outcome assessors unaware of the intervention a participant received as follows.

- Low risk of bias: if the outcome assessment was masked but others unlikely to introduce bias unmasked. Judicial assessors of outcomes, data analysis, data safety and monitoring committee members and manuscript writers can also be masked. In acupuncture trials, masking of participants and care providers is not feasible and hence it is not used as a measure of quality. The intervention evaluation of whether outcome assessors were masked may be sufficient (Egger 2003).

- High risk of bias: if there was no masking or incomplete masking, and the outcome or the outcome measurement is likely to be influenced by lack of masking.

- Unclear risk of bias: if there was insufficient information to permit judgment of 'low risk of bias' or 'high risk of bias', or the study did not address this outcome.

4. Incomplete outcome data addressed (attrition bias)

The purpose of randomization is to generate comparable intervention groups. This baseline equivalence may be disrupted if participants are lost to follow up. We assessed each main outcome for information on the number of participants in each group lost to follow up or excluded from the study and the reasons for losses to follow up or exclusion. We extracted these data for each of the primary and secondary outcomes based on the criteria as follows.

- Low risk of bias: if it was specified that there were no dropouts or withdrawals; reasons for missing outcome data unlikely to be related to true outcome; missing outcome data balanced in numbers across intervention groups, with similar reasons for missing data across groups; missing data have been imputed using appropriate methods; the missing outcomes were not enough to induce a clinically relevant impact on the intervention effect estimate.

- High risk of bias: if the number or reasons for missing outcome data are likely to be related to true outcome; the proportion of missing outcomes with observed event risk was enough to induce clinically relevant bias in intervention effect estimate; dropouts and withdrawals were not described.

- Unclear risk of bias: if there was insufficient reporting of attrition/exclusions to permit judgment of 'low risk of bias' or 'high risk of bias' or the study did not address this outcome.

5. Intention-to-treat (ITT) analysis (reporting bias)

Extraction of information can be difficult due to unclear reporting. If studies reported that an ITT analysis had been performed, we assessed whether an ITT analysis was possible on all patients from the published data (i.e. whether there were any exclusions from the trial after randomization), and the number of patients lost to follow up.

Two authors independently performed quality assessment and disagreements were resolved by a third party. We recorded concordance between authors and disagreements were resolved through discussion. We contacted the authors of trials categorized as 'unclear' for additional information. If the authors did not respond within six weeks, we graded the trial based on the available information.

Measures of treatment effect

We planned to use mean difference to calculate continuous data (e.g. measurement for progression change in axial length) and the risk ratio for dichotomous data (e.g. proportion of patients' post-treatment refractive error changes).

Unit of analysis issues

In this review, we included two trials that randomized participants. In future updates of this review, if we identify trials that randomize eyes rather than participants, we planned to analyze and pool the data based on the trial reports separately (include one eye, each eye per participant). If cross-over trials or cluster-randomized trials are included, we planned to use special techniques for data analysis and present the findings separately according to the non-parallel group design (Higgins 2011a).

Dealing with missing data

We contacted the authors of the included studies to supply missing information on study methods, participants, intervention and control, follow-up data, outcome data but were unsuccessful in obtaining the data. One trial author responded that the data were lost due to a computer problem and another trial author has not responded up to now. We therefore assessed missing data for the included studies as unavailable outcome and that they were not missing at random, and discussed the extent to which results/conclusions of the review could be altered by the missing data. We planned to perform a sensitivity analysis including and excluding trials with a poor follow-up rate (below 70%) in future updates of the review if data are available.

Assessment of heterogeneity

We assessed for heterogeneity by:
1. examining the characteristics of the included studies;
2. looking for overlap in the confidence intervals of the forest plots;
3. performing a Chi$^2$ test for statistical heterogeneity; and
4. using the results of the I$^2$ statistic to estimate the amount of heterogeneity between trials.

Some clinical heterogeneity was present; different types of co-intervention (one is 0.25% atropine eyedrops combined with auricular stimulation (Liang 2008), another was acupressure and interactive multimedia (Yeh 2008), different acupuncture points and outcome measure time (mean eight months and 15 weeks, respectively).

Assessment of reporting biases

We planned to assess publication bias using a funnel plot (effect size against standard error) if sufficient studies were available (Egger 1997). Asymmetry can be due to publication bias, but can also be due to a relationship between trial size and effect size. In the event that a relationship was found, we would have examined the clinical diversity of the studies (Egger 1997). However, as only two RCTs were included, we were unable to assess publication bias.

Data synthesis

We did not perform data synthesis as the included trials assessed different outcomes. In future updates of this review, when sufficient numbers of trials are included and if significant heterogeneity is identified, we will perform the pre-specified subgroup analyses to see if they explain the heterogeneity. If no statistical heterogeneity is detected, and no clinical heterogeneity within the trials, we will combine the results in a meta-analysis using a random-effects model for the primary outcome. If the number of trials is three or fewer, we will use a fixed-effect model. If substantial statistical or clinical heterogeneity is detected either by the Chi$^2$ test or by observation, we will not combine study results but present them in a descriptive summary.

Subgroup analysis and investigation of heterogeneity

We planned to perform the following pre-specified subgroup analyses for potential clinical heterogeneity if sufficient data were available:

1. different types of acupuncture therapies (manual versus electrical stimulation etc);
2. different acupuncture points;
3. different age of participants (meta-regression was to be performed when appropriate data were available); and
4. different degrees of myopia at baseline of participants.

As no sufficient data were available we did not perform subgroup analysis.

Sensitivity analysis

If sufficient data are available for future updates, we will conduct sensitivity analyses to determine the impact of exclusion of studies with lower methodological quality by:
1. excluding trials at a high risk of bias and 'unclear' on any parameter of methodological quality;
2. excluding unpublished studies;
3. excluding trials that have used a single vision test;
4. excluding industry studies; and
5. excluding trials that have not assessed compliance.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies.

Results of the search

The electronic searches retrieved a total of 158 references (Figure 1). The Trials Search Co-ordinator screened results from the non-Chinese language databases and removed eight records as they were not relevant to the scope of the review. Two authors screened 149 titles and abstracts, we rejected 114 reports as they were not related to the review or were not a trial etc. We obtained full-text copies of 35 potentially relevant reports and reviewed them, and found two RCTs that met the inclusion criteria (Liang 2008; Yeh 2008). We also found that two other reports were duplicates of the two included primary studies.
158 records identified through electronic database searching

8 records removed by Trials Search Co-ordinator as not relevant to the scope of the review

149 records screened by the authors

114 records rejected as not relevant

31 full-text articles excluded, with reasons. 2 records excluded as they were duplicates

35 full-text articles assessed for eligibility

2 studies included in the review

Figure 1. Study flow diagram.
Included studies
We included two RCTs with a total of 131 myopic children undertaken in Taiwan (Liang 2008; Yeh 2008). The interventions of the two trials were both co-interventions and included auricular points. Differences between the trials included:

- types of co-intervention; Liang 2008 used 0.25% atropine eyedrops combined with auricular stimulation whilst Yeh 2008 used acupressure and interactive multimedia;
- different acupuncture points; auricular points plus meridian points (Yeh 2008);
- outcomes were measured at different times; 15 weeks (Yeh 2008) and at least six months (Liang 2008).

Liang 2008 evaluated the effectiveness of 0.25% atropine eyedrops combined with auricular stimulation (0.25A+E) in school-aged myopic children recruited from a regional hospital in Hsinchu from July 2005 to 2006. The auricular acupoints were selected each time using visual observation by the same experienced doctor who had an acupuncture license. All selected auricular acupoints were divided into three groups for treatment:
1. Yan (Eye), Gan (Liver), Shenmen (Gate of Spirit);
2. Mu1 (Vision 1), Pi (Spleen), Xin (Heart);
3. Mu2 (Vision 2), Shen (Kidney), Pizhixia (Subcortex).

The sequence these three groups followed was changed every month in the same order and the laterality was changed every week to avoid allergy. The control groups were treated with 0.25% atropine eyedrops and 0.5% atropine eyedrops only. After treatment for an average of 8.28 ± 2.48 months, the 0.25A+E groups showed a marked reduction in myopia progression compared to the 0.25A along group.

Yeh 2008 evaluated the effectiveness of the co-intervention (acupressure and interactive multimedia) in the fifth grade of an elementary school. Firstly, the acupressure intervention with cowherb seeds was placed onto the six common auriculars and eight common meridian points. Secondly, interactive multimedia was provided, which contained files of text, images, film, and sound to provide instructions. The major content of interactive multimedia included structure and function of the eye, and acupressure on auricular and meridian points. All experimental children were instructed by the interactive multimedia to press each point of the selected auricular and meridian points for at least one minute (three to five minutes) per time, and three times per day for 15 weeks. The adhesive patch with seeds was renewed weekly. The control group did not receive the intervention.

For details of the two included studies see the 'Characteristics of included studies' table.

Excluded studies

Risk of bias in included studies
Liang 2008 was assessed as low risk of bias for all parameters and Yeh 2008 was assessed as low risk of bias for all parameters with the exception of allocation concealment which was assessed as unclear. For further details please see the 'Risk of bias' table (Characteristics of included studies), the methodological quality summary (Figure 2) and the methodological quality graph (Figure 3).
Figure 2. Methodological quality summary: review authors’ judgments about each methodological quality item for each included study.

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Figure 3. Methodological quality graph: review authors’ judgments about each methodological quality item presented as percentages across all included studies.
Allocation
We assessed the allocation concealment at a low risk of bias for Liang 2008 and unclear for Yeh 2008.

Blinding
We assessed both trials as at low risk of bias for masking of the outcome assessor.

Incomplete outcome data
We assessed both trials as at low risk of bias for incomplete outcome data.

Selective reporting
We assessed both trials as low risk of bias for selective reporting of outcomes.

Effects of interventions
No data met our pre-defined criteria of one diopter mean change for the primary outcome.

Primary outcome

Myopia progression
Myopia progression was defined as one diopter mean change and the proportion of children/adolescents whose myopia increased by one diopter per year.
We contacted the trial authors but were unable to obtain the data required for our pre-defined criteria and we did not perform a meta-analysis as the trials were assessing different outcomes.

Secondary outcomes

1. Mean change in axial length per year
Only one study (Liang 2008) reported the outcome of axial length. After treatment the mean axial length elongation (ALE) was 0.14 ± 0.11 mm per year in the 0.25A+E group and 0.16 ± 0.09 mm per year in the 0.25A group. No difference in axial length was found between the groups by ANOVA (P = 0.86).

2. Mean change in corneal radius of curvature
No data were available for this outcome.

3. Adverse outcomes
Children experienced mild pain, heat or swelling while pressing and the drop out rate of the two studies was 11.5% (3/26) (Liang 2008) and 15.6% (13/83) (Yeh 2008). In Liang 2008, three patients dropped out from the 0.25A+E group due to painful bi-auricular stimulation. In Yeh 2008, 13 participants did not complete the study; eight for personal reasons and five due to accepting other therapies.

4. Economic data
No economic data were available.

DISCUSSION
Over the past two decades acupressure (one form of acupuncture) has been used to stop the progress of myopia in children and adolescents and it is easily performed.

Summary of main results
Two RCTs conducted in Taiwan with a total of 131 participants were included in this review. We did not perform a meta-analysis as the trials were assessing different outcomes. Neither trial met our pre-defined primary outcome criteria of myopia progression defined as one diopter mean change. Only one trial reported the changes of axial length which met the review’s secondary outcome, but a non-significant difference was found among the intervention group and control group. Both trials reported that several children experienced mild pain, heat or swelling while pressing and they dropped out of the trial (Liang 2008; Yeh 2008).

Overall completeness and applicability of evidence
The rate of withdrawal after treatment was 11.5% (3/26) (Liang 2008) and 15.6% (13/83) (Yeh 2008), respectively. For the co-intervention of the acupuncture, pain caused by auricular stimulation was reported, thus compliance with acupuncture treatment should be noted. No significant change in axial length elongation
(ALE) was observed, which might relate to the short period of intervention; follow up for at least one year is required. A more sensitive method for effect measurement in ALE is needed (e.g. axial length measured by IOL Master machine). The progression of myopia from baseline should also be considered, at 0.25 diopter and above.

**Quality of the evidence**

There are some factors that may decrease the quality of the evidence in this review. We included only two trials with a total of 131 participants. Due to lack of data, data analysis was not based on the primary outcome of myopia progression at one diopter but on the mean changes of refractive errors. Data expressed as the mean of the two eyes may not be the optimal way of dealing with paired eye data. Although one trial was assessed as having low risk of bias across its parameters (Liang 2008), there could be some bias for Yeh 2008 as we were not able to assess allocation concealment as it was not reported in the article.

**Potential biases in the review process**

Language biases might exist, as non-English trials from Japan or Korea where acupuncture is widely used and accepted, have not been identified. The measure of treatment effect should have been based on the primary dichotomous outcome, however no data were available.

**Agreements and disagreements with other studies or reviews**

This review was unable to draw a conclusion on the effect of acupuncture in slowing the progression of myopia in children based on the trials that were included in the review.

**Implications for practice**

The current evidence from this review is unable to support the benefit of acupuncture for slowing the progression of myopia in children. Without further evidence, acupuncture treatment cannot be recommended for clinical use. In practice, it is necessary to train the acupuncturist to use the correct acupuncture points, alternative stimulation, frequency of one day or a week to reduce/eliminate the possible pain experienced by children and adolescents from acupuncture treatment for myopia.

**Implications for research**

The potential role of acupuncture/acupressure alone for slowing down the progression of myopia in children and adolescents should be explored in further placebo-controlled RCTs with large sample sizes. More appropriate types of acupuncture (such as auricular acupuncture) and compliance with treatment should be further explored at least six months and longer. Axial length elongation of the eye should be investigated for at least one year.

**ACKNOWLEDGEMENTS**

We thank the Cochrane Eyes and Vision Group editorial team, especially Anupa Shah, Managing Editor for CEVG, for her assistance throughout the development of the review. Many thanks to Iris Gordon, Trials Search Co-ordinator for CEVG, for developing much of the electronic search strategies and providing the relevant search results, locating the relevant trials and co-ordinating the translation of potentially relevant studies. We also thank Ms Sue Elliott, Catey Bunce, Drs. Daniel Ng Kwok-Keung and Karla Zadnik and Dr Richard Wormald for their useful comments on the protocol of this review. Thank you to Kinnar Merchant for translating Russian studies. Also thanks to Dr. Zhou Yong for his help in earlier drafts of the protocol. Thanks to Dr. Chuangfang Lee in Taiwan for helping contact the study author and to Dr Chih-Kai Liang and Shih-Liang Chang for their suggestions on future relevant studies.
References to studies included in this review

Liang 2008  [published data only]


Yeh 2008  [published data only]


References to studies excluded from this review

Chang 2003  [published data only]


Che 1994  [published data only]


Chen 1989  [published data only]


Deng 2003  [published data only]


Ge 1991  [published data only]


Hadida 1986  [published data only]


Kang 1989  [published data only]


Lai 1991  [published data only]


Li 2003  [published data only]


Li 2004  [published data only]


Li 2007  [published data only]


Liu 1993  [published data only]


Liu 1994  [published data only]


Lv 1999  [published data only]


Okovitov 1997  [published data only]


Ostberg 1992  [published data only]


Ren 1997  [published data only]


Ribaute 1987  [published data only]

Ribaute A. Stabilisation de la myopie evolutive, par acupuncture, chez des enfants prepuberes (a propos de dix cas en cours de traitement). Revue Francaise de Medecine Traditionnelle Chinoise 1987;125:309–11.

Saw 2002  [published data only]


Sun 2004  [published data only]

Acupuncture for slowing the progression of myopia in children and adolescents (Review)

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Acupuncture for slowing the progression of myopia in children and adolescents (Review)

Copyright © 2011 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.
### Characteristics of included studies  
**Liang 2008**

<table>
<thead>
<tr>
<th>Methods</th>
<th>A single-masked, randomized controlled clinical trial</th>
</tr>
</thead>
</table>
| Participants | Setting: a regional hospital in Hsinchu, Taiwan from July 2005 to 2006  
Number randomized: 71 school-aged children with myopia were randomly assigned to 3 groups, 22 treated with 0.25% atropine (0.25A) only, 23 treated with 0.5% atropine (0.5A) only; 26 treated with 0.25% atropine together with stimulation of the auricular acupoints (0.25A+E)  
**Age:**  
0.25A group: 9.91 ± 2.11  
0.5A group: 10.91 ± 2.43  
0.25A+E group: 10.23 ± 1.66  
**Sex (male/female):**  
0.25A group: 22 (12/10)  
0.5A group: 23 (13/10)  
0.25A+E group: 26 (12/14)  
**Inclusion criteria:**  
1. All included patients, aged 6 to 15 years, had myopia (spherical equivalent greater than -0.5 D) after cycloplegic refraction.  
2. The astigmatism and anisometropia were less than 2.0 D.  
3. Intraocular pressure was less than 21 mmHg.  
**Exclusion criteria:**  
1. The presence of a related disease such as infection, ulceration, eyelid disease, ocular disorders and auricular disorders.  
2. Individuals with amblyopia or strabismus.  
3. Individuals who were receiving other therapy during the period of study.  
4. Individuals suffering a hemostasis disorder or other systemic disease.  
5. Individuals who did not comply with the treatment (eyedrops and/or stimulation of auricular acupoints) over 7 days |
| Interventions | Treatment:  
The intervention groups were treated with auricular acupoint stimulation together with 0.25% atropine eyedrops (0.25A+E group). The auricular acupoints were selected each time using visual observation by the same experienced doctor who had an acupuncture license. A 1 mm alloy ball (MAGRAN® contained Fe over 95%, Cr 1.3-1.6%, C 1%, Si, Mn, P, S and Ni) plastered with 7 mm tape, made in Japan (Sakamura Lab. & Co.) was applied to stimulate the selected auricular acupoints. All selected auricular acupoints were divided into 3 groups for treatment:  
1. Yan (Eye), Gan (Liver), Shenmen (Gate of Spirit)  
2. Mu1 (Vision 1), Pi (Spleen), Xin (Heart)  
3. Mu2 (Vision 2), Shen (Kidney), Pizhixia (Subcortex)  
The sequence these 3 groups followed was changed every month in the same order and the laterality was changed every week to avoid allergy. All children and their parents were instructed and conformed to the standard stimulation method of acupressure presented by the same doctor. Sunglasses were used for outdoor activities to prevent photophobia. |
and an immediate response to any abnormal skin condition near the acupressure point was suggested.

**Control:**
The control groups were treated with 0.25% atropine eye drops (0.25A group) and 0.5% atropine eye drops (0.5A group) only.

**Duration:**
The acupoint stimulation was 3 times a day and the treatments carried out for at least 6 months.

**Outcome measures:**
Follow-up examinations were performed monthly for at least 6 months, but only every 3 months and at the final month cycloplegic refraction was used. The examinations included best-corrected visual acuity on a Snellen chart, IOP as measured by a Canon Tonometer TX-10 and refractive status as tested by Tomey autorefrakometer RC-100 under cycloplegia after applying 1% cyclogyl eyedrops (Alcon Laboratories Inc., Fort Worth, TX, USA). The axial length elongation (ALE) of the eyeball was measured every 3 months using an ultrasound scan (Nidek, US 800A), which became the secondary endpoint. Topical anesthetic agent (0.5% Alcaine of Alcon Laboratories) was used to paralyze the cornea and measurement was repeated 3 times in each patient. All measurements were performed by 1 independent technician who was masked to the treatment assignments of the patients throughout the study. Responses were recorded on a standard form by parents and the side effects of all the treatments were also recorded.

**Statistical analysis:**
All data were expressed as Mean ± SD. The baseline values were analyzed by analysis of variance (ANOVA). The gender, age, initial refraction (diopters), initial axial length and follow-up time for the various groups were compared using the Scheffe’s post hoc test. Post-treatment effects were evaluated by ANCOVA with the change in diopter as the dependent variable and follow-up time, gender, age and ALE as covariates, in order to compare the differences among the 3 groups. The change in axial length was also compared in the same way and the differences were adjusted by the Bonferroni method for multiple post hoc comparisons. The 95% confidence interval (CI) for differences was reported and a P value < 0.05 was considered statistically significant.

**Outcomes**
71 participants were recruited and 64 participants completed the clinical follow up for at least 6 months. A total of 7 participants dropped out of this study (9.9%). No statistical difference was observed among these 3 groups by ANOVA.

**Primary outcomes:**

Myopia progression (the difference between the refraction error measured before and after treatment)

After treatment for an average of 8.28 ± 2.48 months, the mean myopia progression (primary endpoint) for each group was:

- 0.38 ± 0.32 diopter per year (D/Y) in the 0.25A group;
- 0.15 ± 0.15 D/Y in the 0.5A group; and
- 0.21 ± 0.23 D/Y in the 0.25A+E group.

The 0.5A (95% CI: -0.35 to -0.07, P = 0.02) and 0.25A+E (95% CI: -0.29 to -0.03, P = 0.01) groups showed a marked reduction in myopia progression compared to the 0.25A group. However, the difference in mean myopia progression between the 0.5A and the 0.25A+E groups was not significant (95% CI: -0.18 to 0.08, P = 1.00).

**Secondary outcomes:**

Mean change in axial length measured by any method.
No difference in ALE (the secondary endpoint) was found among the 3 groups by ANCOVA ($P = 0.86$). The mean ALE for each group was: 0.16 ± 0.09 mm per year in the 0.25A group; 0.12 ± 0.12 mm per year in the 0.5A group; and 0.14 ± 0.11 mm per year in the 0.25A+E group.

**Adverse outcomes**

Three participants dropped out due to photophobia (1 in the 0.25A group, 2 in the 0.5A group), 1 patient was lost to communication in the 0.5A group and 3 patients dropped out in the 0.25A+E group because of tenderness during massaging of the acupoints (given reason: painful bi-auricular stimulation). Among the cases that completed this study, no obvious side effects were observed during the entire course except for two cases of eczema at the acupoint.

### Notes

- **Risk of bias**

<table>
<thead>
<tr>
<th>Bias</th>
<th>Authors’ judgement</th>
<th>Support for judgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random sequence generation (selection bias)</td>
<td>Low risk</td>
<td>“Each child was assigned to one of the three groups using a simple randomized procedure based on a calculator generated random number obtained by an independent research assistant” (p 307)</td>
</tr>
<tr>
<td>Allocation concealment (selection bias)</td>
<td>Low risk</td>
<td>“All patients were blinded to treatment assignment during the period of study” (p 307)</td>
</tr>
<tr>
<td>Incomplete outcome data (attrition bias) All outcomes</td>
<td>Low risk</td>
<td>71 patients were recruited and 64 patients completed the clinical follow up for at least 6 months. A total of 7 patients dropped out of this study (9.9%). Three patients dropped out due to photophobia (1 in the 0.25A group, 2 in the 0.5A group), 1 patient was lost to communication in the 0.5A group and 3 patients dropped out in the 0.25A+E group because of tenderness during massaging of the acupoints</td>
</tr>
<tr>
<td>Selective reporting (reporting bias)</td>
<td>Low risk</td>
<td>Stated the reasons of those who did not complete the study and reported intention-to-treat (ITT) cases in the description section of the results</td>
</tr>
<tr>
<td>Blinding of outcome assessment (detection bias) All outcomes</td>
<td>Low risk</td>
<td>“All measurements were performed by one independent technician who was blind to the treatment assignments of the patients throughout the study” (p 307)</td>
</tr>
</tbody>
</table>
Children who had visual impairment were randomly assigned to either the experimental or the control group. A table of random numbers was used. The sample size was according to the World Health Organization's Sample Size Determination in Health Studies software.

Setting: All children in the fifth grade of an elementary school in Taipei, Taiwan
Number randomized: Total 83 school children participated and 13 did not complete the study. The final sample size consisted of 35 in each group, with an attrition rate of 16%. Experimental group: 42 participants; control group: 41 participants
Age:
Mean age 11 ± 0.5 years
Sex (male/female):
Experimental group: 21/14; control group:19/16
Inclusion criteria:
Children in the fifth grade with a visual acuity of Snellen equivalent ranging from 6/30 to 6/9.6 in at least one eye were recruited on a voluntary basis
Exclusion criteria:
Using other treatments for myopia.

Intervention group: included acupressure and interactive multimedia.
First, the acupressure intervention was delivered onto the auricular and meridian points: six common auricular points for improving visual health were used, including eye, liver, shenmen, kidney, eye disorder1, and eye disorder2. A seed-embedding method was used to give stimuli on the auricular points. The adhesive patch with seed was renewed weekly by the authors. In addition, eight common meridian points associated with eye function were used, including zanzhu (UB.2), jingming (UB.1), chengqi (St.1), sibai (St.2), taiyang (Ex.2), baihui (Du.20), fengchi (GB.20), and heguyi (LI.4). Second, the intervention was provided by interactive multimedia which contained files of text, images, film, and sound, to provide instructions. The major content of the interactive multimedia included structure and function of the eye, and acupressure on auricular and meridian points
Control group: No intervention.
Duration:
During the 15-week intervention period, acupressure and interactive multimedia instruction were provided every Thursday morning. All experimental children were instructed by the interactive multimedia to press each point of the selected auricular and meridian points for at least 1 minute (3 to 5 minutes) per time, and three times per day. The adhesive patch with seeds was renewed weekly. The validity of the instruction content was assessed by two experts, and achieved a content validity index (CVI) of 1.
Outcome measures:
The children's assessment included a demographic sheet, a visual health knowledge questionnaire, and examinations of visual acuity and refractive error. The visual health knowledge questionnaire contained 15 true-false questions. A remote-controlled vision inspector (SP-015E, Taipei, Taiwan) with the Snellen chart and a viewing distance of 6 m was used for the visual acuity examination. Refractive error was measured by autorefractometers (Topcon KR-8100, Tokyo, Japan)

Interventions
83 school children participated and 70 children completed follow up for 15 weeks. 13 did not complete the study; 8 for personal reasons and 5 due to accepting other treatments, with an attrition rate of 16%.

**Primary outcomes:**

*Mycopia progression (the difference between the refraction error measured before and after treatment)*

At pre-test, the experimental and control groups had average refractive errors of -1.75 ± 1.54 and -2.61 ± 1.76 diopters, respectively. At post-test, the experimental and control groups had average refractive errors of -1.98 ± 2.04 and -2.98 ± 1.94 diopters, respectively. There was a significant difference of changing refractive error between the two groups (t = 2.12, P = 0.038). In addition, the results of the paired t test demonstrated that the difference of refractive error between pretest and posttest was insignificant in the experimental group (t = 1.86, P = 0.071) and significant in the control group (t = 5.44, P < 0.001).

**Secondary outcomes:**

*Mean change in axial length measured by any method*: No information in the reports. However, after the co-intervention (acupressure and interactive multimedia), other benefits showed as follows:

- Impacts on visual health knowledge: The average score of visual health knowledge increased to 12.6 (2.1) in the experimental group, but decreased slightly to 11.2 (2.5) in the control group. The experimental group showed a significant increase in visual health knowledge at post-test compared with the baseline level (t = 3.42, P = 0.002), but the control group did not (t = 0.21, P = 0.838).

- Impacts on visual acuity: This study also demonstrated that the acupressure on auricular and meridian points could improve vision. Visual acuity improved by at least 1 line in more than 60% of the children in the experimental group. The Wilcoxon signed ranks test showed a statistically significant difference of changing visual acuity between the two groups (Z = -3.72, P < 0.001).

**Adverse outcomes**

The children experienced mild pain, heat or swelling while pressing.

---

**Notes**

Some limitations in this study existed: First, the children involved in this study are not representative of students in elementary schools, and thus generalization of the results should be of some concern. Second, the study was aimed at investigating the combination of acupressure and interactive multimedia for children, but not either alone. Third, the improvement of visual health was only demonstrated in the short-term period, and the long-term effect is unknown.
Allocation concealment (selection bias) | Unclear risk | Not reported.
---|---|---
Incomplete outcome data (attrition bias) | Low risk | 83 school children participated and 13 did not complete the study; 8 for personal reasons and 5 due to accepting other treatments. The final sample size consisted of 35 in each group, with an attrition rate of 16% (p 434).

Selective reporting (reporting bias) | Low risk | Described the reason of the 13 participants who did not complete the study.

Blinding of outcome assessment (detection bias) | Low risk | Research assistants who did not recognize the experimental or control participants examined visual acuity and measured refractive error (p 433). Data for the intervention and control groups were collected before and after the intervention using the same procedure by three researchers who performed the examinations of visual acuity and refractive error, and administered questionnaires, respectively (p 13).

ALE: axial length elongation

**Characteristics of excluded studies [ordered by study ID]**

<table>
<thead>
<tr>
<th>Study</th>
<th>Reason for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chang 2003</td>
<td>Did not meet this review criteria as the control group was acupressure used in one ear versus two ears</td>
</tr>
<tr>
<td>Che 1994</td>
<td>Did not meet this review criteria as the control group was acupuncture</td>
</tr>
<tr>
<td>Chen 1989</td>
<td>Not a RCT. Case report</td>
</tr>
<tr>
<td>Deng 2003</td>
<td>Did not meet this review criteria as the control group was acupuncture</td>
</tr>
<tr>
<td>Ge 1991</td>
<td>Case report with no controlled</td>
</tr>
<tr>
<td>Hadida 1986</td>
<td>Study with single arm</td>
</tr>
<tr>
<td>Kang 1989</td>
<td>Not a RCT</td>
</tr>
<tr>
<td>Author</td>
<td>Notes</td>
</tr>
<tr>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>Lai 1991</td>
<td>Did not meet this review criteria as the control group was acupuncture</td>
</tr>
<tr>
<td>Li 2003</td>
<td>CCT, as randomized patients with different diopters; did not meet this review criteria as the control was a drug</td>
</tr>
<tr>
<td>Li 2004</td>
<td>CCT, as the treatment group was not randomly assigned</td>
</tr>
<tr>
<td>Li 2007</td>
<td>Did not meet this review criteria, as the control group was given a drug intervention</td>
</tr>
<tr>
<td>Liu 1993</td>
<td>Not a RCT as the treatment group was not randomly assigned</td>
</tr>
<tr>
<td>Liu 1994</td>
<td>Not a RCT - as this trial did not use random method to allocate patients into two different group, they meant to random selected 39 cases to match the treatment group. Therefore, it is not a real randomized clinical trial</td>
</tr>
<tr>
<td>Lv 1999</td>
<td>Did not meet this review criteria as the control groups were acupuncture and massage</td>
</tr>
<tr>
<td>Okovitov 1997</td>
<td>Not a RCT - controlled study. In Russian</td>
</tr>
<tr>
<td>Ostberg 1992</td>
<td>Not a RCT - controlled study</td>
</tr>
<tr>
<td>Ren 1997</td>
<td>Case report with single arm</td>
</tr>
<tr>
<td>Ribaute 1987</td>
<td>Study with single arm</td>
</tr>
<tr>
<td>Saw 2002</td>
<td>Not a RCT - a review</td>
</tr>
<tr>
<td>Sun 2004</td>
<td>Did not meet this review criteria as the control group was given a drug intervention</td>
</tr>
<tr>
<td>Sun 2006</td>
<td>Did not meet this review criteria as the intervention was massage exercises</td>
</tr>
<tr>
<td>Tao 2006</td>
<td>CCT as the treatment group was not randomly assigned. The glasses group were not included in the total patients and were provided by another school</td>
</tr>
<tr>
<td>Teng 2007</td>
<td>Case report</td>
</tr>
<tr>
<td>Val’kova 1989</td>
<td>Not a RCT - controlled study. In Russian</td>
</tr>
<tr>
<td>Wong 1980</td>
<td>Not a RCT and the participants had high myopia and were older than 18 years old</td>
</tr>
<tr>
<td>Xuan 2002</td>
<td>Not a RCT as the treatment group was not randomly assigned</td>
</tr>
<tr>
<td>Yang 1987</td>
<td>Not a RCT - control study</td>
</tr>
<tr>
<td>Yang 1993</td>
<td>Not a RCT - control study</td>
</tr>
<tr>
<td>Zhang 1995</td>
<td>Case reports with no controlled</td>
</tr>
<tr>
<td>Zhao 2007</td>
<td>Not a RCT as the treatment group was not randomly assigned</td>
</tr>
</tbody>
</table>
Zhou 2000 | Not a RCT as the treatment group was not randomly assigned

CCT: controlled clinical trial
RCT: randomized controlled trial
DATA AND ANALYSES

This review has no analyses.

APPENDICES

Appendix 1. CENTRAL search strategy

#1 MeSH descriptor Myopia
#2 myop*
#3 sight* AND (short or near*)
#4 (#1 OR #2 OR #3)
#5 MeSH descriptor Acupuncture
#6 MeSH descriptor Acupuncture Therapy
#7 MeSH descriptor Acupuncture Points
#8 MeSH descriptor Acupuncture, Ear
#9 MeSH descriptor Electroacupuncture
#10 MeSH descriptor Electric Stimulation Therapy
#11 MeSH descriptor Acupressure
#12 MeSH descriptor Moxibustion
#13 acupuncture* or electroacupuncture*
#14 acupressure* or moxibustion
#15 (#5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14)
#16 (#4 AND #15)

Appendix 2. MEDLINE (OVID) search strategy

1. randomized controlled trial.pt.
2. (randomized or randomised).ab,ti.
3. placebo.ab,ti.
4. dt.fs.
5. randomly.ab,ti.
6. trial.ab,ti.
7. groups.ab,ti.
8. or/1-7
9. exp animals/
10. exp humans/
11. 9 not (9 and 10)
12. 8 not 11
13. exp myopia/
14. myop$.tw.
15. ((short or near) adj3 sight$).tw.
16. or/13-15
17. exp acupuncture/
18. exp acupuncture therapy/
19. exp acupuncture points/
20. exp acupuncture ear/
21. exp electroacupuncture/
22. exp electric stimulation therapy/
23. exp acupressure/
24. exp moxibustion/
25. (acupuncture$ or electroacupuncture$).tw.
26. (acupressure$ or moxibustion).tw.
27. or/17-26
28. 16 and 27
29. 12 and 28

The search filter for trials at the beginning of the MEDLINE strategy is from the published paper by Glanville et al (Glanville 2006).

Appendix 3. EMBASE (OVID) search strategy

1. exp randomized controlled trial/
2. exp randomization/
3. exp double blind procedure/
4. exp single blind procedure/
5. random$.tw.
6. or/1-5
7. (animal or animal experiment).sh.
8. human.sh.
9. 7 and 8
10. 7 not 9
11. 6 not 10
12. exp clinical trial/
14. ((sing$ or doubl$ or trebl$ or tripl$) adj3 (blind$ or mask$)).tw.
15. exp placebo/
16. placebo$.tw.
17. random$.tw.
18. exp experimental design/
19. exp crossover procedure/
20. exp control group/
21. exp latin square design/
22. or/12-21
23. 22 not 10
24. 23 not 11
25. exp comparative study/
26. exp evaluation/
27. exp prospective study/
28. (control$ or prospectiv$ or volunteer$).tw.
29. or/25-28
30. 29 not 10
31. 30 not (11 or 23)
32. 11 or 24 or 31
33. exp myopia/
34. exp high myopia/
35. myop$.tw.
36. ((short or near) adj3 sight$).tw.
37. or/33-36
38. exp acupuncture/
39. exp electroacupuncture/
40. exp acupressure/
41. exp moxibustion/
Appendix 4. AMED search strategy

1 Myopia/
2 myop$.tw.
3 ((short or near) adj3 sight$).tw.
4 or/1-3
5 acupuncture/
6 Electroacupuncture/
7 Electric stimulation/
8 Acupressure/
9 Moxibustion/
10 (acupuncture$ or electroacupuncture$).tw.
11 (acupressure$ or moxibustion).tw.
12 or/5-11
13 4 and 12

Appendix 5. LILACS search strategy

myop$ and acupuncture$ or acupressure$ or moxibustion

Appendix 6. metaRegister of Controlled Trials search strategy

myopia and acupuncture

Appendix 7. ClinicalTrials.gov search strategy

Myopia AND Acupuncture

Appendix 8. National Center for Complementary and Alternative Medicine search strategy

myopia and acupuncture

Appendix 9. Chinese Biological Medicine Database search strategy

1 exp myopia /
2. myopia
3 or/1-2
4 exp acupuncture/
5 exp acupuncture therapy/
6 exp electroacupuncture/
7 exp ear acupuncture/
8 exp eye acupuncture/
9 exp head acupuncture/
10 exp acupuncture points/
Appendix 10. China National Knowledge Infrastructure search strategy

(Acupuncture or pressure or eye exercise) and myopia in (key words and title)

Appendix 11. Chinese scientific periodical database of VIP INFORMATION search strategy

(Acupuncture or pressure or eye exercise) and myopia in (key words and title)

HISTORY

Protocol first published: Issue 2, 2009
Review first published: Issue 9, 2011

CONTRIBUTIONS OF AUTHORS

Conceiving the review: Wei ML, Liu JP
Designing the review: Wei ML, Liu JP
Co-ordinating the review: Wei ML
Data collection for the review
- Designing search strategies: Wei ML, Liu JP, Li N, Cochrane Eyes and Vision Group editorial base
- Undertaking searches: Wei ML, Li N, Iris Gordon
- Screening search results: Wei ML, Liu JP
- Organizing retrieval of papers: Wei ML
- Screening retrieved papers against inclusion criteria: Wei ML, Li N, Liu JP
- Appraising quality of papers: Wei ML, Li N, Liu JP
- Extracting data from papers: Wei ML, Li N
- Writing to authors of papers for additional information: Wei ML
- Providing additional data about papers: Wei ML, Li N, Liu JP
- Obtaining and screening data on unpublished studies: Wei ML, Li N
Data management for the review
- Entering data into RevMan: Wei ML, Li N

Acupuncture for slowing the progression of myopia in children and adolescents (Review)

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Analysis of data: Wei ML, Li N, Liu JP
Interpretation of data
- Providing a methodological perspective: Liu JP, Liu M
- Providing a clinical perspective: Li N, Liu JP
- Providing a policy perspective: Liu JP, Wei ML
- Providing a consumer perspective: Wei ML
Writing the review: Wei ML, Liu JP
Providing general advice on the review: Wei ML
Securing funding for the review: Wei ML, Liu ML
Performing previous work that was the foundation of the current study: Wei ML

DECLARATIONS OF INTEREST
None

SOURCES OF SUPPORT

Internal sources
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DIFFERENCES BETWEEN PROTOCOL AND REVIEW
The ‘Risk of bias’ table, the Cochrane Collaboration’s tool for assessing methodological quality of studies, has been included and completed for the review.
INDEX TERMS

Medical Subject Headings (MeSH)
*Acupuncture Points; *Disease Progression; Axial Length, Eye [physiopathology]; Myopia [*therapy]; Randomized Controlled Trials as Topic

MeSH check words
Adolescent; Child; Humans