Acupuncture for melasma in women: a systematic review of randomised controlled trials

Qianyun Chai,1 Yutong Fei,1 Huijuan Cao,1 Congcong Wang,1 Jinzhou Tian,2 Jianping Liu1

ABSTRACT

Background Melasma is a common facial skin disorder seen in women. Manual acupuncture (MA) is widely used alone or in combination with conventional treatments for melasma in China.

Objectives To assess the effectiveness and safety of MA for melasma, and explore the range of treatments applied.

Methods Six databases were searched systematically for randomised controlled trials (RCTs) on acupuncture for melasma in women up to November 2014. RevMan software was used for data analysis. The Cochrane tool of Risk of Bias was used to assess the methodological quality of the RCTs.

Results Eight RCTs involving 587 women were included. Seven studies used the encircling needling method, four studies used the quick needling method and four studies used intensive needle manipulations. Five studies provided individualised acupuncture treatments. Points used with highest frequency were SP6, ST36 and SP10. MA was compared with oral tranexamic acid, vitamin C and E, vitamin C and tamoxifen, topical 20% azelaic acid, hydroquinone, vitamin A and no treatment. Studies were too heterogeneous to conduct a meta-analysis. For global outcome measures, seven trials showed that MA groups were significantly better than the conventional treatments either with a better cure rate or with a better combined cure rate and markedly effective rate, and one trial did not (MA vs vitamin A). No acupuncture-related adverse events were reported.

Conclusions MA appeared to be beneficial and safe for women with melasma, but insufficient evidence was found to reach conclusions. The encircling needling method, the quick needling method, intensive needle manipulations and individualised points' selection were widely used. Well-designed trials are required.

Trial registration number PROSPERO Systematic review registration: CRD42013006396.

INTRODUCTION

Melasma, or chloasma, is a common facial skin disorder. The condition is also known as the ‘mask of pregnancy’ because the hypermelanosis often appears during pregnancy. Melasma is characterised by irregular tan or brown macules on the forehead, cheeks and upper lip.1 2 Studies have shown that quality of life can be greatly affected by melasma, including the psychological distress caused by the condition.2 The pathogenesis of melasma is not well understood. It has been suggested that UV exposure causes melanocytes to become hyperfunctional, producing cytokines and leading to peroxidation of lipids in the cellular membrane and generation of excess melanin.3

Three systematic reviews have assessed conventional interventions used in the management of melasma.4–6 They reached similar conclusions that the treatments available for melasma, including hydroquinone, triple-combination creams, iontophoresis, skin-lightening complexes, broad-spectrum sunscreen, vitamin C and combination therapies, remain unsatisfactory. Owing to the heterogeneity of studies, none of the reviews were able to pool data. No definite conclusion about effectiveness was reached. But adverse events, such as skin irritation, itching, burning and stinging, were commonly reported. In addition, those studies included were generally judged to provide low-quality evidence.

Manual acupuncture (MA) is a widely accepted treatment for melasma in China. In this review, MA refers to giving acupuncture treatments by manually inserting thin, metal acupuncture needles into the skin, usually at acupuncture points, and manually manipulating the needles to achieve de qi sensation. Clinical studies have suggested that acupuncture has a
therapeutic potential, improving symptoms by reducing skin lesion areas and lightening the pigmentation. Research findings also indicate that acupuncture seems to alter pathogenic pathways that cause hyperpigmentation, by decreasing levels of oestrogen, lipid peroxidation and α-melanocyte-stimulating hormone, and increasing the level of superoxide dismutase. But a systematic review of the evidence for the effectiveness and safety of acupuncture for melasma is still lacking.

Our study aimed to systematically assess the effectiveness and safety of MA for melasma in women, and to explore the range of treatments applied.

**METHODS**

**Criteria for selecting studies**

**Types of studies:** randomised controlled trials (RCTs) without limitation of publication language or publication status.

**Participants:** women who were diagnosed with melasma, regardless of age.

**Types of intervention:** MA used alone or combined with conventional treatments (such as hydroquinone, triple-combination creams, combination therapies, rucinol, vitamin C iontophoresis and skin-lightening complexes) compared with conventional treatments or sham acupuncture or no treatment. Studies using any other kind of acupuncture, such as EA or other traditional Chinese medicine (TCM) interventions, such as herbal medicine or moxibustion, were excluded.

**Types of outcome measure:** primary outcomes included changes in melasma severity evaluated by participants or investigators, including subjective outcomes without limitation on the criteria for therapeutic effect evaluation, and objective outcomes tested by histology or reflectance spectrophotometer; secondary outcomes included required time for pigmentation improvement, quality of life and long-term remission rate (>12 months); adverse events.

**Search strategy**

We searched the following sources from inception to the end of November, 2014: PubMed, the Cochrane Library, China National Knowledge Infrastructure (CNKI), Chinese Scientific Journal Database (VIP), Chinese Biomedical database (CBM) and the Wanfang database. We searched the title, abstract and for keywords using ("melasma" or "chloasma") and ("acupuncture" or "acupuncture point" or "acupoint" or "acup"). Reference lists of included primary and review articles were checked for cited articles not captured by electronic searches. Ongoing trials from ClinicalTrials.gov, the metaRegister of Controlled Trials (mRCT), and the Chinese Clinical Trial Registry (ChiCTR) were also searched.

**Data extraction and quality assessment**

Two authors (YF and QC) independently extracted data and assessed the methodological quality of included studies using the Cochrane Collaboration tool of risk of bias: generation of random sequence, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, selective reporting, incomplete outcome data and other bias. For ‘other bias’, diagnosis/inclusion/exclusion criteria and baseline comparability were considered. Judgements were classified as low, high and unclear risk of bias. We also adopted the STRICTA (ST andards for Reporting Interventions in Clinical Trials of Acupuncture) check list to show the reporting quality of acupuncture interventions. Telephone interviews with the trial authors were conducted to obtain missing data and information.

**Data synthesis and analysis**

Data were analysed using relative risk (RR) with 95% CI for binary outcomes, or mean difference with 95% CI for continuous outcomes. RevMan V.5.2.10 software (Cochrane Collaboration) was used for data analyses. Meta-analysis was planned when the trials had admissible clinical homogeneity and statistical heterogeneity (measured by I² test, I²<50%). Since clinical heterogeneity of acupuncture treatments (needling manipulation, selection of points, etc) could not be avoided, it was intended to use only a random effects model. We planned to explore publication bias using a funnel plot analysis and present the original data without pooling when there was high heterogeneity.

**RESULTS**

**Description of studies**

After primary searches of six databases and three clinical trial registers, 359 citations were identified. By screening titles and abstracts, 116 papers were excluded. Eighty-five papers remained and full texts were retrieved. Two trials were published in both English and Chinese in different journals on different publication dates. We included only the earlier versions, which were published in Chinese. Finally, eight trials from China were included in this review (figure 1).

The eight trials included involved 587 women with melasma (table 1). Age range of subjects was 18–56 years and disease duration was between 3 months and 22 years. Sample size varied from 29 to 50 participants, with an average of 37 women per group. Five trials adopted the 2003 Chinese Association of Integrative Medicine Melasma Diagnostic Criteria (CAIM-D). One trial adopted the Standard of Diagnosis and Therapeutic Effect of Traditional Chinese Medicine Diseases (STD), one trial uncited melasma diagnostic criteria, which was in accordance with CAIM-D, and another trial did not report diagnostic criteria.

**Interventions**

Experimental interventions included MA alone (n=7) and MA plus 2% hydroquinone cream (n=1).
MA was administered once daily for 20–40 min each session, and 2–7 times weekly. The number of MA treatment sessions varied from 21 to 60 over 4–16 weeks. Control interventions included conventional drugs or no treatment. Conventional drugs included oral vitamin E plus oral vitamin C; oral tamoxifen plus oral vitamin C; oral tranexamic acid; topical vitamin A cream; topical 20% azelaic acid cream; and topical 2% hydroquinone cream. Treatment duration ranged from 4 to 16 weeks.

In acupuncture groups, the main points were fixed but varied across the included studies. Five studies added additional points selected according to TCM syndrome differentiation. Across the included studies, in addition to skin lesion areas, a total of 30 points were used (table 2). Points used with highest frequencies were SP6 (seven trials), ST36 (five trials) and SP10 (five trials). Of the points used in the included studies, 73% (22/30) were on the Spleen, Liver, Stomach, Bladder meridians and Conception vessel. Variation in the number of main points in a single trial was 3–12, with an average of seven.

Seven of the eight studies used the encircling needling (EN) method together with routine needling methods (figure 2). Three to ten needles were inserted for about 0.3 cun (10 mm) deep around the skin lesion with every needle tip toward the centre of the lesion areas. One needle could also be added in the middle of the lesion areas. The number of the needles varied with the size or severity of the skin lesion, with a suitable distance of 15 mm between adjacent needles. The other studies did not give details.

Four studies used the quick needling (QN) method for the points on the back. One to five points were chosen for each session. Needles were withdrawn after manipulation without needle retention and then patients were asked to lie down to receive normal acupuncture treatment.

Four studies adopted intensive needling manipulations during treatments. Those methods were (1) manipulating the needles once every 10 min during retention; (2) manipulating for 1 min at a rotation frequency of 120 rounds per minute; (3) using tonifying and reducing methods.
**Table 1** Characteristics of included studies*  

<table>
<thead>
<tr>
<th>Trials</th>
<th>Sample size (average age, range)</th>
<th>Diagnostic criteria</th>
<th>Interventions</th>
<th>Control</th>
<th>Outcome measure</th>
<th>Main results of CAIM-G</th>
<th>n (Tx : Ctrl)</th>
<th>Estimates RR (95% CI)</th>
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<tbody>
<tr>
<td>Chen16</td>
<td>Tx: 34 (28.6±2.4)</td>
<td>CAIM-D</td>
<td>QN, EN, BA, APBS</td>
<td>Tamoxifen</td>
<td>CAIM-G</td>
<td>Cured</td>
<td>9:1</td>
<td>7.94 (1.07 to 59.08)†</td>
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<td></td>
<td>Ctrl: 30 (33.4±1.2)</td>
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<td></td>
<td></td>
<td>CAIM-I</td>
<td>Markedly effective</td>
<td>16:10</td>
<td>1.41 (0.76 to 2.62)†</td>
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<td></td>
<td></td>
<td>Effective</td>
<td>5:12</td>
<td>0.37 (0.15 to 0.92)†</td>
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<td></td>
<td></td>
<td>Ineffective</td>
<td>4:7</td>
<td>0.50 (0.16 to 1.55)</td>
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<td></td>
<td>CCME</td>
<td>25:11</td>
<td>2.01 (1.20 to 3.35)†</td>
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<tr>
<td>Du15</td>
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<td>EN, BA, APBS</td>
<td>Vitamin E and vitamin C</td>
<td>CAIM-G</td>
<td>Cured</td>
<td>15:3</td>
<td>4.52 (1.42 to 14.42)†</td>
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<tr>
<td></td>
<td>Ctrl: 38 (33.1, 27–42)</td>
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<td></td>
<td></td>
<td>Markedly effective</td>
<td>17:8</td>
<td>1.92 (0.94 to 3.94)</td>
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<td></td>
<td></td>
<td>Effective</td>
<td>7:12</td>
<td>0.53 (0.23 to 1.20)</td>
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<td></td>
<td></td>
<td>Ineffective</td>
<td>3:15</td>
<td>0.18 (0.06 to 0.58)†</td>
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<td>CCME</td>
<td>32:11</td>
<td>2.63 (1.56 to 4.45)†</td>
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<td>Li et al20</td>
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<td>EN, BA, APBS, Hydroquinone</td>
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<td>CAIM-G</td>
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<td>Markedly effective</td>
<td>35:15</td>
<td>2.33 (1.47 to 3.70)†</td>
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<td>(40, 28–50)</td>
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<td></td>
<td>Effective</td>
<td>12:22</td>
<td>0.55 (0.30 to 0.98)†</td>
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<td>0.23 (0.07 to 0.76)†</td>
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<td>35:15</td>
<td>2.33 (1.47 to 3.70)†</td>
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<tr>
<td>Li and Li18</td>
<td>Tx: 29 (18–48)</td>
<td>SDT</td>
<td>EN, BA</td>
<td>Vitamin A</td>
<td>SDT, in accordance with CAIM-G</td>
<td>Cured</td>
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<td>Ctrl: 30 (20–45)</td>
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<td></td>
<td>Markedly effective</td>
<td>8:5</td>
<td>1.66 (0.61 to 4.47)</td>
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<td></td>
<td>Effective</td>
<td>16:18</td>
<td>0.92 (0.59 to 1.43)</td>
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<td></td>
<td></td>
<td>Ineffective</td>
<td>3:7</td>
<td>0.44 (0.13 to 1.55)</td>
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<td></td>
<td></td>
<td>CCME</td>
<td>10:5</td>
<td>2.63 (0.77 to 8.99)</td>
</tr>
<tr>
<td>Liao19</td>
<td>Tx: 37</td>
<td>CAIM-D</td>
<td>QN, EN, BA</td>
<td>Azelaic acid</td>
<td>No reference, but in accordance with CAIM-G</td>
<td>Cured</td>
<td>28:4</td>
<td>7.00 (2.73 to 17.98)†</td>
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<td></td>
<td>Ctrl: 37</td>
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<td></td>
<td></td>
<td>Markedly effective</td>
<td>3:21</td>
<td>0.14 (0.05 to 0.44)†</td>
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<td></td>
<td>(27–56)</td>
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<td></td>
<td>Effective</td>
<td>3:6</td>
<td>0.50 (0.14 to 1.85)</td>
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<td></td>
<td>Ineffective</td>
<td>3:6</td>
<td>0.50 (0.14 to 1.85)</td>
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<td></td>
<td>CCME</td>
<td>31:25</td>
<td>1.24 (0.95 to 1.62)</td>
</tr>
<tr>
<td>Ma et al17</td>
<td>Tx: 30 (37, 24–52)</td>
<td>CAIM-D</td>
<td>QN, EN,BA</td>
<td>Tranexamic acid</td>
<td>CAIM-G</td>
<td>Cured</td>
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<td>Ctrl: 30 (35, 22–48)</td>
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<td>Markedly effective</td>
<td>14:9</td>
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<td>Effective</td>
<td>3:7</td>
<td>0.43 (0.12 to 1.50)</td>
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<td></td>
<td></td>
<td>Ineffective</td>
<td>1:8</td>
<td>0.13 (0.02 to 0.94)†</td>
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<td></td>
<td>CCME</td>
<td>26:15</td>
<td>1.73 (1.18 to 2.55)†</td>
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<td>Shi et al13</td>
<td>Tx: 30 (40.46±3.57)</td>
<td>CAIM-D</td>
<td>EN, BA, APBS</td>
<td>No treatment</td>
<td>CAIM-G</td>
<td>Cured</td>
<td>2:0</td>
<td>5.00 (0.25 to 99.95)</td>
</tr>
<tr>
<td></td>
<td>Ctrl: 30 (38.86±3.32)</td>
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<td></td>
<td>Markedly effective</td>
<td>9:0</td>
<td>19.00 (1.16 to 312.42)†</td>
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<td></td>
<td>Effective</td>
<td>16:6</td>
<td>2.67 (1.21 to 5.88)†</td>
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<td></td>
<td></td>
<td>Ineffective</td>
<td>3:24</td>
<td>0.13 (0.04 to 0.37)†</td>
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<td></td>
<td></td>
<td>CCME</td>
<td>11:0</td>
<td>23.00 (1.42 to 373.46)†</td>
</tr>
<tr>
<td>Su and Zheng14</td>
<td>Tx: 45</td>
<td>CAIM-D</td>
<td>QN, BA, APBS</td>
<td>Vitamin C and vitamin E</td>
<td>CAIM-G</td>
<td>Cured</td>
<td>5:3</td>
<td>1.67 (1.11 to 7.79)†</td>
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<tr>
<td></td>
<td>Ctrl: 45</td>
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<td>Markedly effective</td>
<td>17:12</td>
<td>1.42 (0.77 to 2.61)</td>
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<td>(33.86, 25–48)</td>
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<td></td>
<td>Effective</td>
<td>20:18</td>
<td>1.11 (1.08 to 1.80)</td>
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<td></td>
<td>Ineffective</td>
<td>3:12</td>
<td>0.25 (0.08 to 0.83)†</td>
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<td></td>
<td></td>
<td></td>
<td>CCME</td>
<td>22:15</td>
<td>1.47 (0.88 to 2.44)</td>
</tr>
</tbody>
</table>

*Full details are available in online supplementary table S1.
†Represents significant difference between treatment group and control.

APBS, additional points selected based on syndrome differentiation; BA, body acupuncture points (points on the trunk and limbs); CAIM-D, 2003 CAIM melasma diagnostic criteria† (see result-outcome measures); CAIM-G, 2003 CAIM melasma global grading system† (see result-outcome measures); CAIM-I, 2003 CAIM melasma index† (see result-outcome measures); CCME, combined cure rate and markedly effective rate; Ctrl, control group; EN, encircling needling around the affected areas; NR, not reported; QN, quick needling for the points on the back; SDT, standard of diagnosis and therapeutic effect of traditional Chinese medicine diseases†; Tx, treatment group;
Outcome measures
All included trials reported data of 2003 CAIM melasma global grading system (CAIM-G), which uses four categories to evaluate treatment effects: (1) Cured—(a) lesion size decrease >90%, pigmentation nearly reduced; (b) assessed by CAIM melasma index (CAIM-I): post-treatment index score decreased ≥0.8; (2) markedly effective—(a) lesion size decrease >60%, pigmentation lightened markedly; (b) assessed by CAIM-I: post-treatment index score decreased ≥0.5; (3) effective—(a) lesion size decrease >30%, pigmentation lightened; (b) assessed by CAIM-I: post-treatment index score decreased ≥0.3; (4) ineffective—(a) lesion size decrease <30%, pigmentation failed to lighten; (b) assessed by CAIM-I: post-treatment index score decreased ≤0.3. Two trials reported data of CAIM-I and symptom scores. CAIM-I: (a) lesion score: no lesion=0; lesion size <2 cm²=1; lesion size 2–4 cm²=2; lesion size >4 cm²=3; (b) pigment colour score: normal complexion=0; pale brown=1; brown=2; dark brown=3; (c) total score=affected area score+colour score; (d) index score decrease=(total score before treatment−total score after treatment)/total score before treatment. No objective measurements, time needed for improvement of melasma, quality of life and long-term remission rate of melasma were reported. Data of the CAIM-G were abstracted and analysed. In addition to original four categories of CAIM-G, combined cure rate and markedly effective rate (CCME) was created and analysed by the review authors.

Methodological quality
Assessing risk of bias
Authors of three trials were contacted for further information. According to the reported information and interview information, we found that four trials used a random number table to generate a random sequence; three of them did not use allocation concealment, blinding of participants and personnel, or outcome assessors; only one trial reported blinding of outcome assessors; other information could not be acquired. Since the protocol for each trial was not available, and all the included studies reported only subjective changes in melasma severity evaluated by investigators (such as CAIM-G), the risk of selective reporting bias was judged to be unclear. Only one trial reported that one participant dropped out in the MA group, and none dropped out in the remaining studies based on the

Table 2 Main points used in the included randomised controlled trials (RCTs)

<table>
<thead>
<tr>
<th>Meridians</th>
<th>Number of points</th>
<th>Points</th>
<th>Frequency</th>
<th>Sum of frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic points</td>
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<tr>
<td>Conception vessel</td>
<td>4</td>
<td>CV3</td>
<td>1</td>
<td>6</td>
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<td>Large Intestine</td>
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<td>Taiyin</td>
<td>Spleen</td>
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<td>Jueyin</td>
<td>Liver</td>
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<td>Stomach</td>
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<td></td>
<td>Taiyang</td>
<td>Bladder</td>
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<td>Shaoyang</td>
<td>Gall bladder</td>
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<tr>
<td>Extra points</td>
<td></td>
<td>GB24</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
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<td>EX-CA1</td>
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<td>EX-HN5</td>
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<tr>
<td>Affect areas</td>
<td></td>
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<td>7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
<td>NA</td>
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</tbody>
</table>

NA, not applicable.
numbers reported, thus bias caused by incomplete outcome data was judged to be low for all studies. Two trials were judged to have a low risk of other bias, while the others had an unclear risk of bias owing to insufficient information (figure 3).

Reporting quality of acupuncture interventions
Based on the STRICTA items, reporting quality of interventions varied across studies (see online supplementary figure S1).

Effect estimates
Primary outcomes
CAIM-G, which comprises subjective outcomes to evaluate the changes in melasma severity by the investigators, was in conformity with the primary outcome of this review.

According to CAIM-G, among the eight studies, four trials showed that MA was significantly better than the control groups (oral vitamin C and E; oral vitamin C and tamoxifen; topical 20% azelaic acid) by cure rate; four trials showed that MA was significantly better than the control groups (no treatment, oral vitamin C and E, oral vitamin C and tamoxifen, oral tranexamic acid,) by CCME; and four trials showed that MA was significantly better in decreasing an ineffective rate than control groups (no treatment, oral vitamin C and E, oral tranexamic acid). One trial showed that MA combined with hydroquinone was significantly better than hydroquinone by CCME, and also decreased the ineffective rate. There was no statistically significant difference between groups for other comparisons. The details of estimates, RR and 95% CI of RR are given in table 1.

The studies were too heterogeneous to pool in a meta-analysis owing to the different types of comparisons and different drugs. Also, it was not possible to compare the effectiveness of the different acupuncture methods used. We could only roughly summarise the effects of special acupuncture methods according to the original results as follows: (1) the effect of EN could not be estimated since this was used by seven out of eight studies; (2) the effects of QN, intensive needling manipulations and individualised acupuncture treatments could not be deduced owing to inconsistent results across studies.

Secondary outcomes
None of studies reported the required time for pigmentation improvement, quality of life and long-term remission.

Adverse events
Adverse events in the MA group were not reported. Two trials reported adverse events in the control groups. One trial (patients with melasma and...
mammary gland hyperplasia) found that mild irregular menstruation (6/30) and gastrointestinal dysfunction (4/30) appeared in the third week after tamoxifen and vitamin C were initiated; the other one showed a flushing and burning sensation (1/30) and mild itching (1/30) on the skin lesion in the vitamin A group. The other six trials provided no relevant information.

Funnel plot analysis
Funnel plot analysis was not conducted owing to an insufficient number of trials.

DISCUSSION
Summary of findings
Eight RCTs involving 587 women were included. Seven used the EN method on the lesion area of the face. Quick needling, intensive needle manipulations and individualised acupuncture treatments were used in more than half of the included studies. Body points most often used were SP6, ST36 and SP10. Meta-analysis was unavailable owing to the obvious heterogeneity among trials. Results from original studies seemed to favour acupuncture treatments. No acupuncture-related adverse event was reported.

Different acupuncture techniques
Encircling needling method
EN was applied in seven of the eight studies combined with routine needling methods. It is a classic technique that is still widely used. This technique is often used for localised skin disorders and pain or numbness of the muscles and joints. EN is recorded as a method of accelerating local blood circulation, and thus helps to eliminate pathogenic factors.

Quick needling for the points on the back
QN was applied in four studies. Among the 13 points on the back (the Bladder meridian), BL13, BL15, BL18, BL20 and BL23 were used for regulating Lung, Heart, Liver, Spleen and Kidney, respectively. BL17 is considered to be effective for improving blood circulation. Since it is almost impossible to puncture points located in the anterior of the body and the points on the back simultaneously with the patient in a lying position, QN at points on the back was often used first.

Intensive needling manipulations during treatments
Intensive needling manipulations were applied in four studies. No adverse event was reported in the acupuncture group. Since manipulation methods are commonly discussed in the ancient books, in clinical practice and in the education of acupuncturists in China, these intensive needle manipulations maybe worth trying and are worthy of being tested by trials.

Fixed main points and individualised additional points
All studies used fixed main points, which varied across the studies. Main points were selected according to TCM syndrome differentiation (TCMSD). In the included studies, the understanding of melasma according to TCMSD was largely identical but with minor differences. TCMSD is a holistic approach, which considers that the reasons for the development of melasma and other concomitant symptoms are closely related, and all the symptoms are the consequence of the same pathological process. Therefore, five studies added individualised additional points in order to achieve a holistic effectiveness. We could not obtain confirmation of this owing to the lack of good-quality evidence.

EA for melasma
EA is rarely used for melasma. By searching databases, we identified only one RCT (30:30 cases) using EA for melasma. In this study, random sequence concealment was described. EA was applied on the face around the lesion area, and EA was found to be worse than bee propolis combined with scrape therapy (p<0.05), with no reasons provided. We interviewed five senior acupuncturists, and were given possible reasons for not using EA for melasma as follows: (1) EA provides strong stimulation that may induce hyperpigmentation, even lead to prosopospasm; (2) EA might be harmful to human facial skin and muscle when applied for a long period of time; (3) EA needles often fall off the facial skin because of the shallow depth of insertion.

Implications for clinical practice
MA appeared to be beneficial in the treatment of melasma, and might act as an alternative treatment, either alone or in combination with conventional treatments. EA for the affected skin area may play an important role in the treatment. SP6, ST36 and SP10 were the most frequently used points. Points on the Spleen, Liver, Stomach, Bladder meridians, and Conception vessel were highly used. Also, the QN method on the back, intensive needle manipulations and individualised points selection were widely adopted. The treatment duration could be 2–7 times a week for 4–16 weeks. EA was not generally used for treating melasma. No adverse effect of MA was found.

Limitations of the review
Evidence for the effectiveness of acupuncture for melasma in our review was inconclusive because the number of eligible RCTs was small, the methodological quality was generally poor and meta-analysis could not be performed owing to heterogeneity of the studies. Publication bias of the included trials could not be assessed owing to an insufficient number of trials. Thus, meaningful extrapolation of our results is limited.

In addition to these general limitations, there were several unique problems for this review. Since acupuncture is a non-pharmaceutical treatment, adequacy and applicability of blinding of acupuncturists and patients remain a challenge. Nevertheless, blinding of outcome assessors should be used, but was only done.
by one of the included trials. Though the widely used
diagnostic criteria (CAIM-D) and outcome measure
(CAIM-G) increased the comparability of the results
between the trials, such global outcome measures do
not require objective techniques of evaluation, and are
not internationally recognised. The reporting quality
of acupuncture interventions of included trials limits
future replication.

CONCLUSIONS
MA appears to be beneficial and safe for women with
melasma, but the evidence is inconclusive. The EN
method, QN method, intensive needle manipulations
and individualised points selection were widely used.
Well-designed trials are required to test the effective-
ness and safety of MA for melasma, and also to test
the special needling methods that were widely used in
the clinics.

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Contributors YF generated the idea. YF and QC performed the
literature search, data extraction, risk of bias table evaluation
and STRICTA item evaluation, drafted the paper and
contributed equally. HC, CW, JT and JL revised the paper. YF
gave final approval of the version to be published.

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Original paper

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Acupuncture for melasma in women: a systematic review of randomised controlled trials
Qianyun Chai, Yutong Fei, Huijuan Cao, Congcong Wang, Jinzhou Tian and Jianping Liu

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