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The efficacy and safety of acupuncture and moxibustion for the management of nausea and vomiting in pregnant women: A systematic review and meta-analysis

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ABSTRACT

Background: Nausea and vomiting, which cause considerable multifaceted effects, are commonly experience in early pregnancy. Various therapeutic strategies are employed, including both conventional agents and complementary medicine. However, the effectiveness of complementary medicine remains controversial. The objective of this meta-analysis is to evaluate efficacy and safety of acupuncture and moxibustion in pregnant women.

Methods: We conducted a comprehensive search using electronic databases such as PubMed, Embase, ISI Web, Medline, Cochrane, clinicaltrial.gov, and several Chinese databases. A total of 21 randomized controlled trials were included in this study for quantitative analysis. Forest plots were utilized to evaluate the efficacy and safety of acupuncture and moxibustion. Egger's test was employed to assess publication bias.

Results: The pooled analysis revealed that the acupuncture/moxibustion group was more effective than control group in alleviating nausea and vomiting in early pregnant women (RR: 0.28; 95%CI: 0.21, 0.37). Similar results were observed when comparing the acupuncture group to traditional herbs (RR: 0.08; 95 % CI: 0.01, 0.60), conventional therapy (RR: 0.15; 95 % CI: 0.04, 0.57), and the blank control group (RR: 0.33; 95 % CI: 0.22, 0.51). Moxibustion also exhibited the ability to alleviate nausea and vomiting compared with the blank control group (RR: 0.21; 95 % CI: 0.08, 0.52). As for safety, there were no significant differences in severe adverse events between the acupuncture group and the control group (RR: 0.77; 95%CI: 0.52, 1.14), the blank control group (RR: 0.61; 95%CI: 0.34, 1.10), the sham acupuncture group (RR: 1.05; 95%CI: 0.63, 1.73), or the conventional therapy group (RR: 0.32; 95%CI: 0.06, 1.55).

Conclusion: Acupuncture and moxibustion might be effective for the management of nausea and vomiting in early pregnant women. Moreover, acupuncture might be a relatively safe treatment for pregnancy.

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Abbreviations: CI, confidence intervals; CMS, Chinese medicine syndrome scale; NVP, Nausea and vomiting of pregnancy; PUQE, Pregnancy-Unique Quantification of Emesis; RCTs, randomized controlled trials; RR, relative risk; SD, standard deviation; WMD, weighted mean difference. Corresponding author.

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1. Introduction

Nausea and vomiting of pregnancy (NVP) is a common condition that affects 50–90 % of pregnant women and as many as 18 % pregnant women take medicine to treat it [1]. Among pregnant women experiencing nausea and vomiting, symptoms are classified as mild in about 40 % of cases, moderate in 46 %, and severe in 14 % [2]. Typically, these symptoms begin around 6–8 weeks of gestation and subside by 16–20 weeks [3]. There is a more severe form of NVP known as hyperemesis gravidarum, which can lead to malnutrition, dehydration, gastrointestinal complications, and financial burdens during early pregnancy. Moreover, hyperemesis gravidarum is associated with an increased risk of gestational anemia, preeclampsia, and other adverse maternal and birth outcomes [4–6].

Various metabolic and neuromuscular factors have been proposed as the potential pathogenesis of NVP(7). Nevertheless, the exact cause of this condition remains unknown. The management of NVP encompasses a range of treatment strategies, including outpatient dietary advice, administration of antiemetic drugs, and hospitalization and intravenous fluid replacement in severe or persistent cases. When circumstances allow, non-pharmacological therapies are preferred in order to minimize potential drug side effects to the fetus in this specific population. Acupuncture and moxibustion commonly used as alternative therapies in gynecological and obstetrical conditions [7,8]. However, it remains unclear that the efficacy and safety of acupuncture and moxibustion in early pregnant women who suffering from nausea and vomiting.

The aim of this meta-analysis is to evaluate the efficacy and safety of acupuncture and moxibustion for the management of NVP. We wonder whether these therapies could be viable choices in clinical practice for the management of NVP.

2. Methods

This meta-analysis was initiated on July 5th, 2023. A comprehensive search of electronic databases was conducted, resulting in the inclusion of 21 randomized controlled trials (RCTs) encompassing a total of 2392 participants [9–29]. Registration of the study protocol was done in advance in PROSPERO (No. CRD42023442685). PRISMA 2020 checklist was utilized and completed (Appendix 1).

2.1. Criteria for considering studies

RCTs were deemed eligible for inclusion in this meta-analysis if they investigated the use of acupuncture or moxibustion as interventions for managing nausea and vomiting in pregnant women. We also examined reviews and meta-analyses as additional resources. Exclusion criteria consisted of the following: 1) laboratory studies, cross-sectional studies, cohort studies, non-randomized controlled trials, case-control studies, case reports, letters, commentaries, and summaries; 2) studies conducted on patients with nausea and vomiting from pathological causes; 3) studies that did not report the alleviation of symptoms, changes in clinical scales of nausea and vomiting, or adverse events; 4) studies with inappropriate experimental or control groups; and 5) studies where data could not be extracted.

2.2. Search methods for identification of studies

A systematic search was conducted in several electronic databases, including Pubmed, EMBase, ISI Web, Medline, Cochrane, clinicaltrial.gov, as well as Chinese databases like CNKI, VIP, and WANFANG. The search encompassed various search methods such as mesh terms, title, abstract, and all fields, and it covered the period from the inception to July 2023. The detailed search strategies utilized in this process are provided in Appendix 2. Furthermore, in order to identify potential additional resources, reviews, meta-analyses, and the references of the eligible studies were carefully examined. No restrictions on language or region were applied during the search process.

2.3. Main outcomes

The primary outcomes of this meta-analysis included the following: 1) the comparison of ineffective cases after intervention between the acupuncture/moxibustion group and the control group; and 2) the assessment of changes observed on different scales such as the Chinese medicine syndrome scale (CMS), Pregnancy-Unique Quantification of Emesis (PUQE), or nausea scores. The secondary outcomes focused on: 1) the occurrence of severe adverse events, including threatened abortion, spontaneous abortion, stillbirth, neonatal death, and neonatal congenital abnormalities; and 2) the needle-related adverse events such as pruritus, itching, pain, or bruising around acupoints.

2.4. Data collection and synthesis

All studies obtained from electronic databases were imported into EndNote X9, and duplicate records were eliminated. Two reviewers, Yao Hu and Qian Yang, independently assessed the title, abstract, and full text of each study. 17 studies were originally published in Chinese [10,11,15–29], out of which 10 had English titles and abstracts. The data from these studies was initially extracted in Chinese and subsequently translated by two reviewers. The titles were translated by these two reviewers, and original titles have been included in references. Any discrepancies were resolved by another reviewer, Xianjin Hu. The workflow for these procedures is detailed in Fig. 1.

Based on a predetermined form, data were separately retrieved by two reviewers. Conflicts were resolved by another reviewer. The following information was collected from each study: first author, publication year, country, sample sizes of the different groups, participants' characteristics (age and gestation), interventions, acupoints and duration in each group, and the main outcomes (effective or ineffective cases in different group, scales used to evaluate symptoms in pregnancy, and adverse events). As for efficacy assessment, the original studies employed varying hierarchies, typically consisting of three or four categories. In our meta-analysis, we opted for a simplified approach, consolidating these into two classes—effective or ineffective.

We extracted information of the change in the scale scores between baseline and the end if there was multiple assessment during the intervention. However, the data was not normal distribution and median and interquartile range was calculated in two studies [14,23]. We assumed this part of data was slightly skewed distribution and transformed median and interquartile to mean and standard deviation (SD) via the formula reported in previous studies [30,31]. CMS exhibited some discrepancies across different studies according to various traditional Chinese symptoms. In our meta-analysis, scores range 0–10 was used in Lyu J's research [18], 0–21 in Yuting Z's [23], 0–27 in Yangfan Z's [19], 0–30 in Guihua S's [17] and 0–90 in Yan C's [24]. However, it was not reported in Yuling Z's trial what the score range was. To avoid increasing artificial bias in the meta-analysis, data from this trial were excluded from the pooled analysis of CMS. Additionally, we standardized all CMS to the centesimal system. In Xiaoke W's trials, the researchers compared the efficacy and safety between the experimental group and the control group using various measurement tools such as PUQE, visual analogue



Fig. 1. Flow diagram.

| Table 1 | |
|--------------------------------------|--|
| Characteristics of selected studies. | |

4

| Author | Year | Country | Sam | ple | Age | | Gestation | (weeks) | Intervention | | Acupoints | Duration | Outcome |
|------------------------|------|-----------|-----|-----|--|---|---|--|---|---|---|--------------|---|
| | | | EG | CG | EG | CG | EG | CG | EG | CG | | | |
| C. Smith | 2002 | Australia | 146 | 147 | 29.8 ± 4 | 1.9 | $\textbf{8.5} \pm \textbf{1.8}$ | | Acupuncture | Sham acupuncture | According to TCM diagnosis | 4 weeks | Perinatal outcome |
| C. Smith ^a | 2002 | Australia | 146 | 143 | 29.8 ± 4 | 1.9 | $\textbf{8.5}\pm\textbf{1.8}$ | | Acupuncture | Blank control group | According to TCM diagnosis | | |
| C. Smith** | 2002 | Australia | 147 | 147 | 29.8 ± 4 | 4.9 | $\textbf{8.5}\pm\textbf{1.8}$ | | Acupuncture | Sham acupuncture | PC6 | | |
| C. Smith*** | 2002 | Australia | 147 | 143 | 29.8 ± 4 | 1.9 | $\textbf{8.5}\pm\textbf{1.8}$ | | Acupuncture | Blank control group | PC6 | | |
| D.Habek | 2004 | Croatia | 10 | 8 | $\begin{array}{c} 20.4 \pm \\ 4.7 \end{array}$ | $\begin{array}{c} \textbf{20.8} \pm \\ \textbf{4.1} \end{array}$ | 7 (6–9) ^b | 8 (7–12) ^b | Acupuncture + Conventional therapy | Sham acupuncture + Conventional therapy | PC6 | 1 week | Symptoms alleviation |
| Guihua S | 2017 | China | 49 | 48 | $\begin{array}{c} 31.02 \\ \pm \ 1.05 \end{array}$ | $\begin{array}{c} 31.12 \\ \pm \ 1.15 \end{array}$ | $\begin{array}{c} 9.33 \pm \\ 0.20 \end{array}$ | $\begin{array}{c} 9.35 \pm \\ 0.19 \end{array}$ | Acupuncture + Modified Sini San | Modified Sini San | SP4/GB34/LR3/ PC6/ST36/RN12 | NR | Symptoms alleviation/CMS/ HCG level |
| Guohui Y | 2020 | China | 35 | 34 | $\begin{array}{c} 26.91 \\ \pm \ 4.13 \end{array}$ | $\begin{array}{c} 27.29 \\ \pm \ 4.66 \end{array}$ | NR | | Filiform needle + Conventional therapy + Metoclopramide | Conventional therapy + Metoclopramide | Wrist and ankle | 5 days | Symptoms alleviation |
| Hong Z | 2009 | China | 31 | 31 | $\begin{array}{c} 28.58 \\ \pm \ 4.57 \end{array}$ | $\begin{array}{c} \textbf{28.68} \\ \pm \textbf{ 3.76} \end{array}$ | $\begin{array}{c} 8.90 \pm \\ 1.66 \end{array}$ | $\begin{array}{c} \textbf{8.97} \pm \\ \textbf{1.58} \end{array}$ | Acupuncture + Moxibustion + Conventional therapy | B6 acupoint injection at PC6 + Conventional therapy | RN12 ^Δ /RN10 ^Δ / ST22 ^Δ /PC6/ ST36 | 5 days | Symptoms alleviation/ Nausea scale (VAS) |
| Honghua Z | 2005 | China | 50 | 50 | Ranked | data | Ranked da | ita | A cupuncture + Moxibustion | Modified Suye Huanglian decoction | RN12/SP9/PC6/ ST36 | 1–2 weeks | Symptoms alleviation |
| Honghua Z ^a | 2005 | China | 50 | 50 | Ranked | data | Ranked da | ita | A cupuncture + Moxibustion | Conventional therapy | RN12/SP9/PC6/ ST36 | | |
| Hongyu X | 2013 | China | 47 | 47 | 26 ± 4 | 27 ± 4 | NR | | Acupuncture | Conventional therapy | RN12/ST36/PC6 | 10 days | Symptoms alleviation |
| Juanzhe M | 2013 | China | 30 | 30 | 26.3 ^c | | NR | | Acupuncture + Conventional therapy | Conventional therapy | RN12/BL21 | 5 days | Symptoms alleviation |
| Knight B | 2001 | UK | 22 | 17 | 30.7 [°] | 30.3 ^c | $\textbf{7.8} \pm \textbf{1.0}$ | 8.0 ± 1.0 | Acupuncture | Sham acupuncture | According to TCM diagnosis | 3 weeks | Symptoms alleviation/ Hospital anxiety and depression scores/Nausea scale (VAS)/Adverse events |
| Lihua J | 2014 | China | 20 | 20 | 25.09 ± 3.42 | 26.03 ± 3.19 | 9. 03 ± 2. 15 | $\begin{array}{l} \textbf{8. 98} \pm \textbf{2.} \\ \textbf{28} \end{array}$ | Filiform needle + Conventional therapy | Conventional therapy | RN10/RN11/ RN12/PC6/ST36 | 5 days | Symptoms alleviation/ Perinatal outcome |
| Lyu J | 2021 | China | 40 | 40 | 27.65 + 3.85 | 27.53 + 3.77 | 8.23 ± 1.20 | 8.15 ± 1.14 | Acupuncture + Subcutaneous embedding (thumb-tack needle) | Thumb-tack needle for | PC6/ST36/SP4 | 4 weeks | Symptoms alleviation/CMS |
| Ruying W | 2008 | China | 53 | 42 | 27 ± 3 | 27 ± 4 | NR | | Acupuncture | Conventional therapy | CV17/RN12/ SP6/PC6/ST36 | 6 days | Symptoms alleviation/Blood biochemistry |
| Shujie L | 2007 | China | 47 | 47 | 20–37 ^d | | NR | | Acupuncture | Conventional therapy | RN12/PC6/ST36 | 10 days | Symptoms alleviation |
| Xiaoke W | 2023 | China | 88 | 88 | $\begin{array}{c} 28.8 \pm \\ 4.0 \end{array}$ | $\begin{array}{c} \textbf{28.6} \pm \\ \textbf{4.5} \end{array}$ | $\textbf{9.3}\pm\textbf{2.1}$ | $\textbf{9.4} \pm \textbf{2.2}$ | Acupuncture + (Doxylamine–pyridoxine) | Sham acupuncture + (Doxylamine–pyridoxine) | According to TCM diagnosis | 2 weeks | PUQE/VAS score/GWB score/SAS score/SDS score/ |
| Xiaoke W ^a | 2023 | China | 88 | 88 | $\begin{array}{c} 29.6 \pm \\ 4.6 \end{array}$ | $\begin{array}{c} 29.2 \pm \\ 4.2 \end{array}$ | $\textbf{8.8}\pm\textbf{1.9}$ | 9.1 ± 2.1 | Acupuncture + Placebo | Sham acupuncture + Placebo | According to TCM diagnosis | | NVPQOL/Perinatal outcome/Adverse events |
| Xumei L | 2012 | China | 32 | 32 | $\begin{array}{c} 29.05 \\ \pm \ 8.25 \end{array}$ | $\begin{array}{c} 27.32 \\ \pm \ 7.26 \end{array}$ | $\begin{array}{c} \textbf{7.52} \pm \\ \textbf{2.52} \end{array}$ | $\begin{array}{c}\textbf{8.42} \pm \\ \textbf{2.39}\end{array}$ | Moxibustion + Conventional therapy + Citicoline | Conventional therapy + Citicoline | RN12/PC6/ST36 | 6–10 days | Symptoms alleviation |
| Yan C | 2021 | China | 30 | 30 | 30 ± 9 | 29 ± 9 | $\textbf{7.9} \pm \textbf{2.7}$ | 8.1 ± 3.1 | Moxibustion + Conventional therapy | Conventional therapy | CV17/RN14/ RN12/BL12/ BL17/BL20/ BL21 | 4 days | Symptoms alleviation/CMS/ PUQE |
| Yangfan Z | 2012 | China | 30 | 30 | $\begin{array}{c} 26.73 \\ \pm \ 2.15 \end{array}$ | $\begin{array}{c} \textbf{26.9} \pm \\ \textbf{2.72} \end{array}$ | $\begin{array}{c} 9.28 \pm \\ 1.62 \end{array}$ | $\begin{array}{c} 9.78 \pm \\ 1.62 \end{array}$ | Acupuncture + Conventional therapy | Conventional therapy | SP4/GB34/LR3/ PC6/ST36/RN12 | 5–10 days | Symptoms alleviation/CMS/ HCG level (continued on next page) |

Table 1 (continued)

| Author | Year | Country | Sam | ple | Age | | Gestation | (weeks) | Intervention | | Acupoints | Duration | Outcome |
|-------------------------|------|---------|-----|-----|---------------------|---------------------|---------------------------------|---------------------|----------------------------------|------------------------------|---------------|----------|----------------------------|
| | | | EG | CG | EG | CG | EG | CG | EG | CG | | | |
| Yangfan Z ^a | 2012 | China | 30 | 30 | $\textbf{27.9} \pm$ | $\textbf{26.8} \pm$ | $8.64~\pm$ | 9.49 \pm | Acupuncture + Conventional | Conventional therapy + | SP4/GB34/LR3/ | | |
| | | | | | 2.99 | 2.01 | 1.65 | 1.70 | therapy + Gastric tocolysis soup | Gastric tocolysis soup | PC6/ST36/RN12 | | |
| Yonghong X | 2009 | China | 26 | 25 | 26 [°] | | NR | | Moxibustion + Conventional | Conventional therapy | PC6/ST36/ | 10 days | Symptoms alleviation |
| | | | | | | | | | therapy | | RN12/SP4 | | |
| Yuling Z | 2017 | China | 42 | 42 | 26.43 | 26.93 | 8.78 \pm | $\textbf{8.62} \pm$ | Acupuncture + Conventional | Conventional therapy + | SP4/GB34/LR3/ | 10 days | Symptoms alleviation/CMS |
| | | | | | \pm 6. 53 | \pm 6. 67 | 1.48 | 1.50 | therapy + BaoTai HeYun | BaoTai HeYun decoction | PC6/ST36/RN12 | | |
| | | | | | | | | | decoction | | | | |
| Yuting Z | 2020 | China | 30 | 30 | 31.03 | 29.63 | 10.07 \pm | 10.16 \pm | Filiform needle + Conventional | Conventional therapy | PC6/ST36 | 2 weeks | PUQE/CMS |
| | | | | | \pm 4.40 | \pm 3.40 | 2.32 | 2.25 | therapy | | | | |
| Yuting Z ^a | 2020 | China | 30 | 30 | 29.56 | 29.63 | $10.03~\pm$ | 10.16 \pm | Subcutaneous embedding (thumb- | Conventional therapy | PC6/ST36 | | |
| | | | | | \pm 4.03 | \pm 3.40 | 2.21 | 2.25 | tack needle) + Conventional | | | | |
| | | | | | | | | | therapy | | | | |
| Zhongnan M | 2009 | China | 30 | 30 | 28.23 | 28.63 | $\textbf{8.3} \pm \textbf{1.6}$ | 8.33 \pm | Acupuncture + Conventional | Conventional therapy | BL11/ST37/ | 1 week | Symptoms alleviation/Blood |
| | | | | | \pm 4.73 | \pm 4.86 | | 1.58 | therapy | | PC6/SP4/RN12/ | | biochemistry |
| | | | | | | | | | | | ST36 | | |
| Zhongnan M ^a | 2009 | China | 30 | 30 | 28.23 | 28.87 | $\textbf{8.3}\pm\textbf{1.6}$ | $\textbf{8.57}~\pm$ | Acupuncture + Conventional | Herbs + Conventional therapy | BL11/ST37/ | | |
| | | | | | \pm 4.73 | \pm 4.59 | | 1.66 | therapy | | PC6/SP4/RN12/ | | |
| | | | | | | | | | | | ST36 | | |

EG: experimental group; CG: control group; NR: not reported; CMS: Chinese medicine syndrome score scale; TCM: Traditional Chinese Medicine; PUQE: pregnancy-unique quantification of emesis; SAS: Zung self-rating anxiety scale; SDS: Zung self-rating depression scale; GBW: global assessment of well-being; NVPQOL: NVP quality of life questionnaire; VAS: visual analogue scale; HCG: Human chorionic gonadotropin; SF-36: The Mos 36-item short form health survey.

 $^{\Delta}$ Moxibustion acupoints.

^a It represents different experimental and control groups for the same research.

^b Median (Interquartile range).

^c Mean.

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^d Range of age.

scale, global assessment of well-being scale, Zung self-rating anxiety scale, Zung self-rating depression scale, NVP quality of life questionnaire, perinatal outcome, and adverse events. However, only data of PUQE and adverse events could be extracted. In most of the included studies, fluid infusion, conventional therapy, and electrolyte balance were the fundamental treatments for nausea and vomiting in pregnant women and were referred to as conventional therapy in this meta-analysis. If the control group only received conventional therapy, it was considered as the experimental group compared with a blank control group when the experimental received intervention (acupuncture and/or moxibustion) plus conventional therapy. To calculate the SD for studies that did not disclose the SD of changes in the scale score, we used the Excel spreadsheet provided by the Cochrane website, which allowed us to derive the SD from the p-value or standard error. If there was no other method available to accurately calculate the SD, we used the



Fig. 2. Risk of bias of included RCTs (A: bias summary; B: bias graph).

| | Study or Subgroup | Even | ts | Total E | Control g Events | group Total | Weight | Risk Ratio M-H, Random, 95% Cl | Risk Ratio M-H, Random, 95% Cl |
|--------|--|---|--|---|--|---|---|--|--|
| | D.Habek 2004 | | 1 | 10 | 7 | 8 | 2.1% | 0.11 [0.02, 0.75] | |
| | Guihua S 2017 | | 1 | 49 | 8 | 48 | 1.8% | 0.12 [0.02, 0.94] | |
| | Guohui Y 2020 | | 0 | 35 | 10 | 34 | 1.0% | 0.05 [0.00, 0.76] | |
| | Hong Z 2009 | | 1 | 31 | 5 | 31 | 1.7% | 0.20 [0.02, 1.61] | |
| | Honghua Z 2005* | | 7 | 50 | 31 | 50 | 14.276 | 0.24 [0.12, 0.30] | |
| | Hongvu X 2013 | | 0 | 47 | 6 | 47 | 0.9% | 0.08 [0.00 1.33] | · · · · · · · · · · · · · · · · · · · |
| | Juanzhe M 2013 | | 1 | 30 | 8 | 30 | 1.8% | 0.13 [0.02, 0.94] | |
| | Knight B 2001 | | 6 | 27 | 8 | 26 | 9.0% | 0.72 [0.29, 1.80] | |
| | Lihua J 2014 | | 2 | 20 | 9 | 20 | 3.8% | 0.22 [0.05, 0.90] | |
| | Lyu J 2021 | | 2 | 40 | 9 | 40 | 3.5% | 0.22 [0.05, 0.96] | |
| | Ruying W 2008 | | 2 | 53 | 4 | 42 | 2.7% | 0.40 [0.08, 2.06] | |
| | Shujie L 2007 | | 0 | 47 | 6 | 47 | 0.9% | 0.08 [0.00, 1.33] | • • • |
| | Xumei L 2012 | | 2 | 32 | 8 | 32 | 3.5% | 0.25 [0.06, 1.09] | |
| | Yan C 2021 | | 2 | 30 | 11 | 30 | 3.7% | 0.18 [0.04, 0.75] | |
| | Yangfan Z 2012 | | 7 | 30 | 11 | 30 | 11.6% | 0.64 [0.29, 1.42] | |
| | Yangtan Z 2012* | | 2 | 30 | 6 | 30 | 3.2% | 0.33 [0.07, 1.52] | |
| | Yuling 7 2017 | | 2 | 42 | 7 | 42 | 3 396 | 0.19 [0.02, 1.33] | |
| | Yuting Z 2020 | | 4 | 30 | 8 | 30 | 6.3% | 0.50 [0.00, 1.00] | |
| | Yuting Z 2020* | | 3 | 30 | 8 | 30 | 5.0% | 0.38 [0.11, 1.28] | |
| | Zhongnan M 2009 | | 1 | 30 | 16 | 30 | 2.0% | 0.06 [0.01, 0.44] | · · · · · · |
| | Zhongnan M 2009* | | 1 | 30 | 12 | 30 | 1.9% | 0.08 [0.01, 0.60] | |
| | | | | | | | | | • |
| | Total (95% CI) | | | 799 | | 782 | 100.0% | 0.28 [0.21, 0.37] | • |
| | Total events Heterogeneity: Tau ² = (| 5 0.00; Chi ² = 2 | 55 1.45, df = | = 22 (P = 0.4 | 232 49); I² = (| 0% | | | |
| | Test for overall effect: 2 | Z = 9.10 (P < | 0.00001) | | | | | | Acupuncture/Moxibustion Control group |
| в | 01 J 0 J | Acupun | cture | Tradition | hal herb | s | | Risk Ratio | Risk Ratio |
| | Zhongnan M 2009* | Events 1 | 30 | Events 12 | | 30 10 | 00.0% | 0.08 [0.01, 0.60] | |
| | Total (95% CI) | | 30 | | | 30 10 | 00.0% | 0.08 [0.01, 0.60] | |
| | Total events Heterogeneity: Not a | 1 pplicable | | 12 | | | | | |
| | Test for overall effect | t: Z = 2.46 (F | P = 0.01) |) | | | | | 0.01 0.1 1 10 Acupuncture Traditional herbs |
| С | | Acupund | ture | Conventio | onal the | rapy | | Risk Ratio | Risk Ratio |
| 1 | study or Subgroup | Events | Total | Event | <u>s</u> | Total | Weight | M-H. Random, 95% C | M-H, Random, 95% Cl |
| | Hongyu X 2013 | 0 | 47 | (| 5 4 | 47 | 19.0% | 0.08 [0.00, 1.33] | |
| | Zhongnap M 2008 | 2 | 30 | 10 | * | 42 | 40.0% | 0.40 [0.08, 2.06] | + - |
| | | | 50 | 10 | 7.0 | 50 | 00.4 /0 | 0.00 [0.01, 0.44] | |
| | Total (95% CI) | | 130 | | | 119 | 100.0% | 0.15 [0.04, 0.57] | |
| | Total events | 3 | | 26 | 6 | | | | |
| | Heterogeneity: Tau ² = Test for overall effect: | = 0.29; Chi ² = Z = 2.80 (P | = 2.52, df = 0.005 | f = 2 (P = 0 | 1.28); l² = | = 21% | | | 0.01 0.1 1 10 |
| | | | | | | | | | Acupuncture Conventional thera |
| D | Study or Subaroup | Acupunctu Events 1 | re Sh Total | am acupur Events | ncture g | roup Total | Weight | Risk Ratio M-H. Random, 95% Cl | Risk Ratio M-H. Random, 95% Cl |
| | D.Habek 2004 | 1 | 10 | 7 | | 8 | 40.3% | 0.11 [0.02, 0.75] | |
| | Knight B 2001 | 6 | 27 | 8 | | 26 | 50 7% | | |
| | | | | | | | 00.170 | 0.72 [0.29, 1.80] | |
| | Total (95% CI) | | 27 | | | 24 | 100.0% | 0.72 [0.29, 1.80] | |
| | Total (95% CI) Total events | 7 | 37 | 15 | | 34 | 100.0% | 0.72 [0.29, 1.80] 0.34 [0.06, 2.13] | |
| | Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: 2 | 7 1.24; Chi² = 3 Z = 1.15 (P = | 37 8.18, df = 0.25) | 15 1 (P = 0.07 |); I² = 69 | 34 % | 100.0% | 0.72 [0.29, 1.80] 0.34 [0.06, 2.13] | 0.01 0.1 1 10 Acupuncture Sham acupuncture g |
| F | Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: 2 | 7 1.24; Chi ² = 3 Z = 1.15 (P = | 37 8.18, df = 0.25) | 15 1 (P = 0.07 Blank co |); ² = 69 | 34 | 100.0% | 0.72 [0.29, 1.80] 0.34 [0.06, 2.13] Bisk Batio | 0.01 0.1 1 10 Acupuncture Sham acupuncture g |
| E | Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: 2 Study or Subgroup | 7 1.24; Chi ² = 3 Z = 1.15 (P = <u>Acupuna</u> | 37 3.18, df = 0.25) cture Total | 15 1 (P = 0.07 Blank co <u>Event</u> |); ² = 69 ntrol gr s | 34 % oup <u>Total</u> | 100.0% | 0.72 [0.29, 1.80] 0.34 [0.06, 2.13] Risk Ratio <u>M-H. Random, 95% C</u> | 0.01 0.1 1 10 Acupuncture Sham acupuncture g Risk Ratio |
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| E | Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: 2 Study or Subgroup Guihua S 2017 Guohua S 2017 Guohua Y 2020 Lunarbe M 2012 | 7 1.24; Chi ² = 3 Z = 1.15 (P = <u>Acupung</u> <u>Events</u> 1 0 | 37 3.18, df = 0.25) cture <u>Total</u> 49 35 | 15 1 (P = 0.07 Blank co <u>Event</u> 10 |); ² = 69 ntrol gr 8 0 | 34 % oup <u>Total</u> 40 34 | 00.7% 100.0% Weight 4.3% 2.3% | 0.72 [0.29, 1.80] 0.34 [0.06, 2.13] Risk Ratio <u>M-H. Random, 95% C</u> 0.10 [0.01, 0.78] 0.05 [0.00, 0.76] 0.13 (0.02, 0.01) | 0.01 0.1 10 Acupanture Sham acupandure g Risk Ratio H.H. Random. 95% Cl |
| E | Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: 2 Study or Subgroup Guihua S 2017 Guohui Y 2020 Juanzhe M 2013 | 7 1.24; Chi ² = 3 Z = 1.15 (P = <u>Acupuno</u> <u>Events</u> 1 0 1 2 | 37 8.18, df = 0.25) cture <u>Total</u> 49 35 30 20 | 15 1 (P = 0.07 Blank col Event 10 8 |); ² = 69 ntrol gr s 8 0 8 | 34 % oup Total 40 34 30 20 | Weight 4.3% 4.4% 9.0% | 0.72 [0.29, 1.80] 0.34 [0.06, 2.13] Risk Ratio <u>M-H. Random, 95% 0</u> 0.10 [0.01, 0.73] 0.05 [0.00, 0.76] 0.13 [0.02, 0.94] 0.22 [0.05 [0.90] | 0.01 0.1 10 Acupuncture Sham acupuncture g Risk Ratio MH. Random, 95% CI |
| E _ | Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: 2 Study or Subgroup Guihua S 2017 Guohui Y 2020 Juanzhe M 2013 Lihua J 2014 Lyut 2021 | 7 1.24; Chi ² = 3 Z = 1.15 (P = <u>Acupune</u> <u>Events</u> 1 0 1 2 2 | 37 3.18, df = 0.25) cture Total 49 35 30 20 40 | 15 1 (P = 0.07 Blank coi Event: 8 10 8 8 8 8 8 |); ² = 69 ntrol gr 8 0 8 9 9 | 34 % oup Total 40 34 30 20 40 | Weight 4.3% 2.3% 4.4% 9.0% 8.2% | 0.72 [0.29, 1.80] 0.34 [0.06, 2.13] Risk Ratio <u>M-H. Random, 95% C</u> 0.10 [0.01, 0.78] 0.5 [0.00, 0.76] 0.13 [0.02, 0.84] 0.22 [0.05, 0.90] 0.22 [0.05, 0.90] | 0.01 0.1 1 10 Acupuncture Shem acupuncture g Risk Ratio |
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| E | Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: 2 Study or Subgroup Guihua S 2017 Guohui Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Shujel L 2007 Yangfan Z 2012* | 7 1.24; Chi ² = 3 Z = 1.15 (P = <u>Events</u> 1 0 1 2 2 0 7 2 | 37 1.18, df = 0.25) cture Total 49 35 30 20 40 40 40 30 30 30 | 15 1 (P = 0.07 Blank coi Event 1 1 2 2 2 2 2 2 1 2 1 2 2 2 2 2 2 2 2 |); ² = 69 ntrol gr s 0 8 9 9 6 1 6 | 34 % 70000 70000 40 40 40 40 40 40 40 40 30 30 | Weight 4.3% 2.3% 4.4% 9.0% 8.2% 2.2% 27.6% 7.7% | 0.72 (0.29, 1.80) 0.34 (0.06, 2.13) M-H. Random, 35% (0.10 (0.01, 0.78) 0.13 (0.02, 0.94) 0.22 (0.05, 0.96) 0.22 (0.05, 0.96) 0.22 (0.05, 0.93) 0.24 (0.05, 1.03) 0.46 (0.29, 1.42) 0.30 (0.07, 1.52) | 0.01 0.1 10 Acupaneture Sham acupaneture g Risk Ratio |
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| E - | Total (95% CI) Total events Heterogeneity: Tau ² = : Test for overall effect : Guihua S 2017 Guahut Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Yangfan 2 2012 Yangfan 2 2012 Yangfan 2 2012 Yangfan 2 2012 | 7 1.24; Chi ² = 3 Z = 1.15 (P = Acupund Events 1 0 1 2 2 0 7 7 2 2 2 4 | 37 3.18, df = 0.25) cture Total 49 35 30 20 40 47 30 30 42 30 | 15 1 (P = 0.07 Blank coo Event { 10 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 |); I ² = 69 ntrol gr 8 9 9 6 1 5 7 8 | 34 % Total 40 34 30 20 40 47 30 30 42 30 30 | Weight 4.3% 2.3% 4.4% 9.0% 8.2% 27.6% 7.7% 7.7% 14.9% | 0.72 (0.29, 1.60) 0.34 (0.06, 2.13) M-H. Random, <u>95% (</u> 0.41 (0.01, 0.77) 0.45 (0.00, 0.77) 0.45 (0.00, 0.77) 0.42 (0.05, 0.90) 0.22 (0.05, 0.90) 0.25 (0.17, 1.48) | 0.01 0.1 10 Acupaneture Sham acupaneture g |
| E _ | Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect 2 Study or Subgroup. Guihua S 2017 Guibua S 2017 Guohui Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Shujie L 2007 Yangfan Z 2012 Yuling Z 2017 Yuling Z 2020 | 7 1.24; Chi ² = 3 Z = 1.15 (P = <u>Events</u> 1 0 1 2 2 0 7 7 2 2 4 3 | 37 3.18, df = 0.25) cture Total 49 35 30 20 40 47 30 20 40 47 30 30 20 40 47 30 30 30 30 30 30 30 30 30 30 | 15 1 (P = 0.07 Blank coi Event 10 10 10 10 10 10 10 10 10 10 10 10 10 |); I ² = 69 ntrol gr 8 9 9 6 1 5 7 8 8 | 34 34 % % 0000 7000 34 30 30 40 40 47 30 30 42 30 30 30 | Weight 4.3% 2.3% 2.2% 2.2% 2.2% 7.7% 14.9% 11.8% | 0.72 (0.29, 1.80) 0.34 [0.06, 2.13] Risk Ratio M-H. Random, 85% C 0.10 [0.01, 0.73] 0.65 [0.00, 0.76] 0.25 [0.05, 0.90] 0.22 [0.05, 0.90] 0.22 [0.05, 0.90] 0.22 [0.05, 0.90] 0.22 [0.05, 0.90] 0.25 [0.01, 11, 123] 0.33 [0.11, 11, 123] | 0.01 0.1 10 Acupuncture Sham acupuncture g Risk Ratio MH. Random. 95% CI |
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| E | Total (95% CI) Total events Heterogonely: Tau ² =: Test for overall effect : Guihua S 2017 Guchul Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Yangfan 2 2012 Yangfan 2 2012 Yangfan 2 2012 Yangfan 2 2012 Yangfa 2 2020 Total (95% CI) Total events | 7 1.24; Chi ² = 3 Z = 1.15 (P = Acupuns 1 0 1 2 2 0 7 2 2 4 3 3 | 37 8.18, df = 0.25) cture Total 49 35 30 20 40 47 30 30 30 30 383 0.5 10 10 10 10 10 10 10 10 10 10 | 15 1 (P = 0.07 Blank coi Eventi 10 10 10 10 10 10 10 10 10 10 10 10 10 |); ² = 69 ntrol gr s 8 0 3 9 9 5 1 1 6 7 8 8 3 0 0 0 0 0 0 0 0 0 0 0 0 0 | 34 % Total 40 34 30 40 47 30 30 42 30 30 30 373 | Weight 4.3% 2.3% 4.4% 9.0% 8.2% 2.2% 2.2% 2.7% 7.7% 14.9% 11.8% 100.0% | 0.72 (0.29, 1.60) 0.34 (0.06, 2.13) M-H. Random, 95% (2 0.10 (0.01, 0.73) 0.45 (0.00, 0.77) 0.13 (0.02, 0.94) 0.22 (0.05, 0.90) 0.22 (0.05, 0.90) 0.25 (0.17, 1.48) 0.33 (0.22, 0.51) | 0.01 0.1 10 Acupaneture Sham acupaneture g |
| E | Total (95% CI) Total events Heterogoneity: Tau ² =: Test for overall effect : Study or Subgroup. Guihua S 2017 Guohul Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Shujie L 2007 Yuding Z 2017 Yuding Z 2017 Yuding Z 2020 Total events Heterogoneily: Tau ² =: Total events Heterogoneily: Tau ² =: Stor overall effect | 7 1.24; Chi ² = 3 Z = 1.15 (P = Acupunt Events 1 0 1 2 2 2 0 7 7 2 2 4 3 3 2 4 5 2 2 4 5 2 2 1 0 7 2 2 2 4 3 3 | 37 5.18, df = 0.25) Total 49 35 300 20 40 40 40 40 40 40 30 300 300 | 15 1 (P = 0.07 Blank coi Events 8 10 5 6 6 6 6 7 8 8 90 17 6 90 17 10 (P = 00(P |); ² = 69 ntrol gr 8 9 9 6 1 6 7 8 8 9 9 6 1 6 7 8 8 9 9 6 1 6 7 7 8 9 9 6 1 6 6 7 7 8 9 9 6 6 9 9 6 6 9 9 6 6 9 9 6 6 9 9 6 6 7 7 7 8 9 9 6 6 7 7 7 8 9 9 6 6 7 7 7 8 9 9 6 6 7 7 7 7 8 9 9 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 | 34 % 000p Total 40 40 40 47 30 30 42 30 30 30 373 1 ² = 0% | Weight: 4.3% 2.3% 4.4% 9.0% 2.2% 2.2% 2.2% 7.7% 7.7% 14.9% 111.8% | 0.72 [0.29, 1.60] 0.34 [0.06, 2.13] MH Random, 95% C 0.10 [0.01, 0.73] 0.05 [10.00, 0.77] 0.13 [10.02, 0.94] 0.22 [10.05, 0.80] 0.22 [10.05, 0.80] 0.22 [10.05, 0.80] 0.22 [10.05, 0.80] 0.22 [10.05, 0.80] 0.23 [10.07, 152] 0.33 [10.71, 124] 0.33 [10.71, 124] 0.33 [10.22, 0.51] | 0.01 0.1 10 Acupaneture Sham acupaneture g |
| E - | Total (95% CI) Total events Heterogeneity: Tau ² =: Test for overall effect : Study or Subgroup. Guihua S 2017 Guohul Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Shujie L 2007 Yangfan Z 2012 Yangfan Z 2012 Yuling Z 2017 Yuling Z 2020 Total events Heterogeneity: Tau ² Test for overall effect | 7 1.24; Chi ² = 3 z = 1.15 (P = Acupunc Events 1 0 1 2 2 2 0 7 2 2 2 4 3 3 24 5.00; Chi ² = 2 2.2 4 3 2 4 3 | 37 318, df = 0.25) Total 49 35 30 20 47 30 20 47 30 30 47 30 30 47 30 30 47 30 30 47 30 30 49 5 5 30 49 5 5 30 20 49 5 5 5 5 5 5 5 5 5 5 5 5 5 | 15 1 (P = 0.07 Blank con Event: 3 10 4 5 5 6 11 6 6 7 8 8 8 9 9 15 10 (P = 0.07 |); ² = 69 ntrol gr 8 9 9 6 1 5 7 8 8 9 9 6 1 5 7 7 8 8 9 9 0 0 0.46); 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 | 34 % Total 40 34 40 34 30 30 40 47 30 30 30 373 1 ² = 0% | Weight 4.3% 2.3% 4.4% 2.2% 2.2% 7.7% 7.7% 11.8% | 0.72 (0.29, 1.60) 0.34 (0.06, 2.13) MH, Random, 92% (2 0.10 (0.01, 0.73) 0.45 (0.00, 0.77) 0.13 (0.02, 0.94) 0.22 (0.05, 0.80) 0.22 (0.05, 0.80) 0.23 (0.07, 1.52) 0.33 (0.07, 1.52) 0.33 (0.07, 1.52) 0.33 (0.17, 1.48) 0.33 (0.22, 0.51) | Acupuncture Sham acupuncture g |
| F | Total (95% CI) Total events Heterogeneity: Tau ² =: Test for overall effect : Study or Subgroup, Guihua S 2017 Guchui Y 2020 Guchui Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Shujel L 2007 Yangfan Z 2012 Yuling Z 2017 Yuling Z 2017 Yuling Z 2017 Yuling Z 2017 Yuling Z 2017 Yuling Z 2017 Yuling Z 2020 Yuling Z 2020 Total (95% CI) Total events Heterogeneity: Tau ² Test for overall effect | 7 1.24; Ch ² = 3 Z = 1.15 (P = Acupund Events 0 1 2 2 0 7 2 2 4 4 3 2 4 4 3 2 2 4 4 3 2 2 4 5.11 (P = 2 0 7 2 2 2 4 3 3 2 2 4 3 3 2 2 4 3 3 2 2 4 5.11 (P = 3 7 5.15 (P = 3 7 7 5.15 (P = 3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 | 37 1.16, df = 0.25) cture 49 35 30 20 40 47 30 40 47 30 30 30 30 30 383 = 9.81, d = < 0.000 stion Total | 15 1 (P = 0.07 Blank coi Event: 4 4 4 5 5 6 6 1 1 6 6 7 8 8 8 9 9 (1 1 1 9 9 (1 1 1 9 9 (1 1 9 9 (1 1 9 1 1 9 9 1 1 1 1 |); ² = 69 ntrol gr 8 9 9 5 1 5 7 8 8 9 9 6 1 5 7 8 8 9 9 6 1 1 5 7 7 8 9 9 6 1 1 5 7 7 8 9 9 9 6 1 1 1 1 1 1 1 1 1 1 1 1 1 | 34 % 70000 70000 400 400 400 400 400 400 400 | Weight 4.3% 2.3% 4.4% 2.2% 2.2% 7.7% 7.7% 14.9% 11.8% 100.0% Weight | 0.72 (0.29, 1.80) 0.34 (0.06, 2.13) M-H. Random, 35% C 0.10 (0.01, 0.73) 0.05 (0.00, 0.76) 0.23 (0.05, 0.90) 0.22 (0.05, 0.90) 0.22 (0.05, 0.90) 0.22 (0.05, 0.90) 0.22 (0.05, 0.90) 0.23 (0.07, 1.52) 0.33 (0.07, 1.52) 0.33 (0.07, 1.52) 0.33 (0.07, 1.52) 0.33 (0.07, 1.52) 0.33 (0.22, 0.51) Risk Ratio M-H. Random, 35% C | 0.01 0.1 10 Acupuncture Sham acupandure g Risk Ratio 1 MH-Random .95% CI |
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| E | Total (95% CI) Total (95% CI) Total (95% CI) Total events Heterogeneity: Tau ² = 1 Test for overall effect : Study or Subgroup. Guihua S 2017 Guohul Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Shujie L 2007 Yangfan Z 2012 Yangfan Z 2012 Yangfan Z 2012 Yangfan Z 2012 Yangfan Z 2012 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Study or Subgroup. Heterogeneity: Tau ² = 0 Study or Subgroup. Hongfa Z 2009 Honghua Z 2005 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Hongfa Z 2005 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Hongfa Z 2005 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Kattady or Subgroup. Hongfa Z 2005 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Test for overall effect Z Study or Subgroup. Hong Z 2005 Total (95% CI) Total (95% CI) Total events Heterogeneity: Tau ² = 0 Test for overall effect Z Study or Subgroup. Hong Z 2005 Total (95% CI) Total (95% CI) | 7 7 2 2 2 2 2 2 2 2 2 2 2 2 2 | 37 s.18, df = 0.25) cture Total 49 35 30 20 40 47 30 20 40 47 30 30 383 383 = 9.81, d, et 32 30 26 88 = 0.000 stion Total 5 1 7 7 15 5 10 10 10 10 10 10 10 10 10 10 | 15 Blank co Eventh 4 5 (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (1) (2) (2) (1) (2) (2) (1) (2) (2) (2) (3) (3) |); i ² = 69 ntrol gr 5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 | 34 34 400 34 300 373 373 373 373 300 255 87 100 100 100 100 100 100 100 10 | Weight 4.3% 2.3% 2.3% 2.3% 2.4% 2.4% 9.0% 2.4% 7.7% 14.9% 11.8% 100.0% Weight 11.8% 100.0% Weight 11.0% 46.8% 100.0% 100.0% 100.0% | 0.72 (0.29, 1.80) 0.34 (0.06, 2.13) M-H. Random, 255 (2 0.10 (0.01, 0.75) 0.35 (0.00, 0.75) 0.35 (0.00, 0.75) 0.35 (0.00, 0.75) 0.35 (0.00, 0.75) 0.42 (0.06, 0.95) 0.22 (0.06, 0.95) 0.22 (0.06, 0.95) 0.23 (0.06, 1.30) 0.50 (0.17, 1.46) 0.33 (0.22, 0.51) Risk Ratio M-H. Random, 255 (2 0.21 (0.06, 1.09) 0.25 (0.06, 1.09) 0.25 (0.06, 1.09) 0.45 (0.24, 0.57) 0.49 (0.02, 1.53) 0.21 (0.06, 0.52) Risk Ratio M-H. Random, 255 (2 0.23 (0.14, 0.38) 0.23 (0.14, 0.38) Risk Ratio M-H. Ratio, 255 (2) 0.23 (0.14, 0.38) Risk Ratio M-H. Ratio, 255 (2) 0.20 (0.2, 161) 0.20 (0.2, 161) | Risk Ratio M-H. Random, 95% Cl M-H. Random, 95% Cl |
| E | Total (95% CI) Total events Heterogeneity: Tau ² = 1 Test for overall effect: 2 Study or Subgroup. Guihua S 2017 Guohul Y 2020 Juanzhe M 2013 Lihua J 2014 Lyu J 2021 Shujie L 2007 Yangfan 2 2012 Yangfan 2 2012 Yangfan 2 2012 Yangfan 2 2012 Yangfan 2 2012 Total (95% CI) Total events Heterogeneity: Tau ² = 1 Chall effs/ CI) Total events Heterogeneity: Tau ² = 0 Total eve | 7 12, Chi ² = 2 2 = 1.15 (P = Acupundur 1 0 1 2 2 2 2 2 2 2 2 2 2 2 2 2 | $\begin{array}{c} 37\\ \text{s.18, df} = \\ 0.25)\\ \text{cture} \\ \hline \text{Total} \\ 49\\ 35\\ 30\\ 20\\ 40\\ 47\\ 30\\ 30\\ 30\\ 30\\ 30\\ 30\\ 30\\ 30\\ 30\\ 30$ | $\begin{array}{c} 155\\ 1 \ (P=0.07)\\ \hline \\ 8 \ (I=0.07)\\ \hline \\ \\ \\ 8 \ (I=0.07)\\ \hline \\ \\ 8 \ (I=0.07)\\ \hline \\ \\ \\ 8 \ (I=0.07)\\ \hline \\ \\ \\ \\ 8 \ (I=0.07)\\ \hline \\ \\ \\ \\ \\ 8 \ (I=0.07)\\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$ |); i ² = 69 introl gr s 3 3 3 5 4 10.95); i ² 5 29 31 4 10.95); i ² 5 29 31 4 10.95); i ² 5 5 5 5 5 5 5 5 5 5 5 5 5 | 34 34 30 30 373 30 373 30 373 30 373 30 373 30 373 30 373 30 373 30 373 30 373 30 373 30 30 373 30 30 30 30 30 30 30 30 30 3 | Weight 4.3% 2.3% 2.3% 2.3% 100.0% Weight 38.8% 100.0% Weight 38.8% 100.0% Weight 5.7% 100.0% Weight 100.0% Weight 100.0% Weight 100.0% Weight 100.0% Weight 100.0% 100.0% | 0.72 (0.29, 1.80) 0.34 (0.06, 2.13) M-H. Random, <u>95% C</u> 0.10 (0.17, 0.74) 0.22 (0.05, 0.90) 0.22 (0.05, 0.90) 0.23 (0.07, 1.52) 0.33 (0.02, 0.51) 0.33 (0.02, 1.51) 0.24 (0.08, 0.52) 0.23 (0.14, 0.33) 0.23 (0.14, 0.33) 0.23 (0.14, 0.33) 0.23 (0.14, 0.33) 0.20 (0.02, 1.51) 0.20 (0.02, 1.51) 0.20 (0.02, 1.51) | 0.01 0.1 10 Acupaneture Sham acupaneture g Nisk Ratio 0.01 0.1 10 MH. Random. 39% Cl 0.01 0.1 10 Acupaneture Blank control group MH. Random. 35% Cl MH. Random. 35% Cl |

(caption on next page)

Fig. 3. Forest plot of ineffective rate between acupuncture/moxibustion group and control group (A: acupuncture/moxibustion vs. control group; B: acupuncture vs. traditional herbs; C: acupuncture vs. conventional group; D: acupuncture vs. sham acupuncture; E: acupuncture vs. blank control group; F: moxibustion vs. blank control group; G: acupuncture combined with moxibustion vs. control group; H: acupuncture combined with moxibustion vs. acupoint injection). *It represents different experimental and control groups for the same research.

upper limit of the p-value in the studies to estimate the SD of changes. It's worth noting that using the upper limit of the p-value may lead to more conservative results.

2.5. Quality assessment

Two reviewers independently evaluated the risk of bias in the included trials using the Cochrane Collaboration tool (random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other bias). Any discrepancies between the two reviewers were resolved by another reviewer.

2.6. Statistical analysis

All analyses were performed with Review Manager (v5.3.5; RevMan, the Cochrane collaboration, Oxford, UK) and Stata 17. Continuous variables were calculated as weighted mean difference (WMD) with 95 % confidence intervals (CI), while binary variables were presented as relative risk (RR) with 95%CI. Considering the clinical and methodological heterogeneity among the trials, a random effects model was employed for the statistical analysis. Heterogeneity among the included trials was assessed using the standard Chi-square test (with statistical significance set at p < 0.05) and the I² statistic (with statistical significance set at I² > 50 %). Sensitive analysis would be performed for identifying the potential origin of inhomogeneity when I² > 50 %. Egger's test and funnel plot were performed to assess the potential publication bias.

3. Results

3.1. Features of the selected studies

Our meta-analysis comprised of 21 RCTs involving a total of 2392 pregnant women. The flow diagram depicting the selection process is presented in Fig. 1. After the initial search, 2319 articles were included (253 from Pubmed, 583 from Embase, 338 from ISI Web, 223 from Medline, 410 from Cochrane Library, 83 from clinicaltrial.gov, 129 from CNKI, 163 from VIP, 137 from WANGFAN). In addition, we reviewed related reviews, meta-analyses, and reference lists, which led to the inclusion of 5 additional studies in our analysis. Following the removal of duplicates and screening of titles and abstracts, a full-text assessment was conducted in 40 trials. Ultimately, 21 studies met the inclusion criteria and were included in the final quantitative analysis.

Detailed information from the 21 studies is provided in Table 1. Among these studies, 18 were conducted in China, while one study each was conducted in Australia, Croatia, and the UK. All studies followed a randomized controlled trial design and employed a 1:1 allocation ratio between the acupuncture/moxibustion group and the control group. There are 6 studies that included more than one experimental group which are denoted by asterisk in Table 1. The participants enrolled in these studies were pregnant women (with a mean age of 28.56 years) who experienced symptoms of nausea and vomiting in early pregnancy (with a mean gestation age of 8.76 weeks). The interventions in the experimental groups included acupuncture, moxibustion, or a combination of both, while the control groups received blank control, conventional therapy, traditional Chinese herbs, sham acupuncture, or acupoint injection. The interventions in the experimental groups included acupuncture, moxibustion, or a combination of both, while the control groups received blank control, conventional therapy, traditional Chinese herbs, sham acupuncture, or acupoints injection. The acupoints utilized varied across the different studies but were all related to the meridians responsible for the strengthening of the spleen and regulation of qi. The duration of the intervention ranged from 4 days to 4 weeks, with most of the studies lasting 1-2 weeks. The outcome, which we were interested in, were symptoms alleviation, scales, and adverse events. The primary outcome criteria for 12 trials were the improvement or disappearance of nausea symptoms and vomiting. These trials were conducted by D.Habek, Guihua S, Guohui Y, Hongyu X, Lihua J, Lyu J, Ruying W, Shujie L, Xumei Lu, Yan C, Yangfan Z, Yonghong X. In these studies, the assessment focused on alleviating or eliminating nausea symptoms and vomiting. Another set of trials, led by Hong Z, Honghua Z, Juanzhe M, Yuling Z, Zhongnan M, utilized a different approach, evaluating symptom alleviation through the reduction proportion of vomiting frequency. Various scales were employed across the trials for a more nuanced evaluation. CMS was used in 6 trials by Guihua S, Lyu J, Yan C, Yangfan Z, Yuling Z, and Yuting Z. PUQE was utilized in 3 trials conducted by Xiaoke W, Yan C, and Yuting Z. Additionally, the Visual Analogue Scale was employed in 3 trials led by Hong Z, Knight B, and Xiaoke W. Risk of bias of included studies is shown in Fig. 2-A and 2-B.

3.2. Main outcomes

In the pooled analysis, we counted the ineffective cases between experimental group and control group which is listed in Fig. 3. In Fig. 3-A, it is evident that the acupuncture/moxibustion group had a lower incidence of ineffective cases compared with the control group (RR: 0.28; 95%CI: 0.21, 0.37). In Fig. 3-B, 3-C, 3-D, and 3-E, we compare the effectiveness of acupuncture with traditional

Chinese herbs, conventional therapy, sham acupuncture, and blank control group, respectively. The results indicated that acupuncture was more effective than traditional herbs (RR: 0.08; 95%CI: 0.01, 0.60), conventional therapy (RR: 0.15; 95%CI: 0.04, 0.57), and the blank control group (RR: 0.33; 95%CI: 0.22, 0.51). However, no significant difference was observed between the acupuncture group and the sham acupuncture group (RR: 0.34; 95%CI: 0.06, 2.13). Regarding the pure moxibustion group (Fig. 3-F), it demonstrates effectiveness compared with the blank control group (RR: 0.21; 95%CI: 0.08, 0.52). In the case of acupuncture combined with moxibustion (Fig. 3-G), the experimental group showed a higher effectiveness than the control group (RR: 0.23; 95%CI: 0.14, 0.38). However, in the subgroup analysis (Fig. 3-H), no significant difference was observed between the acupuncture combined with moxibustion group and the acupoint injection group (RR: 0.20; 95%CI: 0.02, 1.61). As for heterogeneity, I² was less than 50 % for all comparisons except for the acupuncture group versus the sham acupuncture group (I² = 69 %). Due to the inclusion of only 2 studies in this subgroup analysis, it was challenging to perform a sensitivity analysis to determine the source of heterogeneity.

In Fig. 4, we compare the differences in Chinese medicine syndrome scores between the experimental group and the control group. In Fig. 4-A, it demonstrates a significant reduction in CMS scores in the acupuncture/moxibustion group compared with the control group (WMD: 18.26; 95%CI: 30.11, -6.41). Similarly, Fig. 4-B shows a notable reduction in CMS scores in the acupuncture group compared with the blank control group (WMD: 17.82; 95%CI: 29.91, -5.72). However, there were no significant differences in CMS scores between the moxibustion group and the blank control group (WMD: 28.86; 95%CI: 88.05, 30.33) as depicted in Fig. 4-C.

In the pooled analysis of PUQE scores, it is observed that the reduction in PUQE scores was more pronounced in the acupuncture/ moxibustion group compared with the control group (WMD: 0.85; 95%CI: 1.36, -0.33) as depicted in Fig. 5-A. Similar results are observed in comparison between the acupuncture group and the blank control group (WMD: 2.43; 95%CI: 4.36, -0.5) in Fig. 5-B, the acupuncture group and the sham acupuncture group (WMD: 0.70; 95%CI: 1.21, -0.19) in Fig. 5-C. However, in Fig. 5-D, there are no significant differences between the moxibustion group and the blank control group (WMD: 2.78; 95%CI: 7.54, 1.98).

Nausea scores, evaluated using the visual analogue scale, are presented in Fig. 6. The comparison of nausea scores between the acupuncture group and control group did not show a significant reduction (WMD: 8.44; 95%CI: 26.16, 9.28). However, it is worth noting that there was considerable heterogeneity observed in the analysis of nausea scores ($I^2 = 66$ %).

Adverse events are counted in Fig. 7. In Fig. 7-A, we analyze the accidence of severe adverse events between the acupuncture group



| В | | Acupuncture roup Mean SD Total | | | Blank control group | | | Mean Difference | | | Mean Di | fference | |
|---|---|-----------------------------------|--------|-------|---------------------|--------|-------|-----------------|------------------------|------|-----------|-----------------|------|
| | Study or Subgroup | Mean | SD | Total | Mean | SD | Total | Weight | IV, Random, 95% CI | | IV, Rando | m, 95% Cl | |
| | Guihua S 2017 | -40.44 | 100.34 | 49 | -20.57 | 50.75 | 48 | 14.7% | -19.87 [-51.42, 11.68] | | | | |
| | Lyu J 2021 | -75.3 | 169.15 | 40 | -60.2 | 135.23 | 40 | 3.2% | -15.10 [-82.21, 52.01] | | | | |
| | Yangfan Z 2012 | -38.15 | 73.81 | 30 | -36.15 | 69.94 | 30 | 11.1% | -2.00 [-38.39, 34.39] | | | | |
| | Yangfan Z 2012* | -50.48 | 97.67 | 30 | -43.82 | 84.78 | 30 | 6.8% | -6.66 [-52.94, 39.62] | | | | |
| | Yuting Z 2020 | -45.86 | 51.24 | 30 | -25.52 | 28.51 | 30 | 33.2% | -20.34 [-41.32, 0.64] | | | | |
| | Yuting Z 2020* | -48.05 | 53.69 | 30 | -25.52 | 28.51 | 30 | 30.9% | -22.53 [-44.28, -0.78] | | | | |
| | Total (95% CI) | | | 209 | | | 208 | 100.0% | -17.82 [-29.91, -5.72] | | • | | |
| | Heterogeneity: Tau ² = 0.00; Chi ² = 1.21, df = 5 (P = 0.94); I ² = 09 | | | | | | | | | 100 | | 50 | 100 |
| Test for overall effect: Z = 2.89 (P = 0.004) | | | | | | | | | | -100 | -50 C | Blank control o | roup |

| С | | Mox | ibustio | n | Blank | control g | roup | | Mean Difference | | Mean Di | fference | | |
|---|--|----------------------|----------|-------|--------|-----------|-------|--------|------------------------|------|----------------------|-----------------|---------------------|----------|
| | Study or Subgroup | Mean | SD | Total | Mean | SD | Total | Weight | IV, Random, 95% CI | | IV, Rando | m, 95% Cl | | |
| | Yan C 2021 | -73.13 | 141.5 | 30 | -44.27 | 85.64 | 30 | 100.0% | -28.86 [-88.05, 30.33] | | | | | |
| | Total (95% CI) | | | 30 | | | 30 | 100.0% | -28.86 [-88.05, 30.33] | _ | | | | |
| | Heterogeneity: Not app Test for overall effect: 2 | olicable Z = 0.96 | (P = 0.3 | 34) | | | | | | -100 | -50 (Moxibustion |) Blank cont | 1 50 rol grou | 100 p |

Fig. 4. Forest plot of Chinese medicine syndrome score scale between acupuncture/moxibustion group and control group (A: acupuncture/moxibustion vs. control group; B: acupuncture vs. blank control group; C: moxibustion vs. control group).



Fig. 5. Forest plot of PUQE between acupuncture/moxibustion group vs. control group (A: acupuncture/moxibustion vs. control group; B: acupuncture vs. blank control group; C: acupuncture vs. sham acupuncture group; D: moxibustion vs. blank control group).

and the control group. The results indicated no significant differences in the incidence of severe adverse events between these groups (RR: 0.77; 95%CI: 0.52, 1.14). Subgroup analysis of severe adverse events also revealed no significant differences between the acupuncture group and the blank control group (RR: 0.61; 95%CI: 0.34, 1.10) (Fig. 7-B), the sham acupuncture group (RR: 1.05; 95% CI: 0.63, 1.73) (Fig. 7-C), or the conventional therapy group (RR: 0.32; 95%CI: 0.06, 1.55) (Fig. 7-D). However, when examining needling-related adverse events, we observed a higher incidence in the acupuncture group compared with the sham acupuncture group (RR: 15.47; 95%CI: 5.30, 45.16) (Fig. 7-E).

3.3. Publication bias

Publication bias was assessed via funnel plot and Egger's test. In Fig. 8, it is observed that there was evident publication bias when

| | Acu | punctu | re | Control group | | | | Mean Difference | Mean Difference | | | nce | |
|---|-----------------------|-----------------------|------------------|---------------|-----------|---------|--------|------------------------|-----------------|---------------|-----------------|------------------|-----|
| Study or Subgroup | Mean | SD | Total | Mean | SD | Total | Weight | IV, Random, 95% Cl | | IV, F | Random, 98 | 5% CI | |
| Hong Z 2009 | -56.45 | 16.99 | 31 | -40.65 | 20.77 | 31 | 60.1% | -15.80 [-25.25, -6.35] | | - | - | | |
| Knight B 2001 | -33.06 | 30.99 | 22 | -35.72 | 28.75 | 17 | 39.9% | 2.66 [-16.17, 21.49] | | | | | |
| Total (95% CI) | | | 53 | | | 48 | 100.0% | -8.44 [-26.16, 9.28] | r. | | | | |
| Heterogeneity: Tau ² = Test for overall effect: | 112.63; (Z = 0.93 | Chi² = 2. (P = 0.3 | .95, df : 85) | = 1 (P = | 0.09); l² | ² = 66% | | | -100 | -50 Acupun | 0 cture Cont | 50 trol group | 100 |

Fig. 6. Forest plot of nausea scores between acupuncture group and control group.

| Α | | Acupund | Acupuncture (Events Total E | | jroup | | Risk Ratio | | Risk Ratio | |
|---|-------------------------------------|--------------|---------------------------------|------------|-----------|--------|----------------------|------|---------------------------|---------------|
| | Study or Subgroup | Events | Total | Events | Total | Weight | M-H, Random, 95% CI | | M-H, Random, 95% CI | |
| | C. Smith 2002 | 11 | 146 | 14 | 147 | 17.6% | 0.79 [0.37, 1.68] | | | |
| | C. Smith 2002* | 11 | 146 | 18 | 143 | 19.0% | 0.60 [0.29, 1.22] | | | |
| | C. Smith 2002** | 16 | 147 | 14 | 147 | 20.1% | 1.14 [0.58, 2.26] | | | |
| | C. Smith 2002*** | 16 | 147 | 18 | 143 | 21.8% | 0.86 [0.46, 1.63] | | | |
| | Lihua J 2014 | 2 | 20 | 9 | 20 | 6.9% | 0.22 [0.05, 0.90] | - | | |
| | Ruying W 2008 | 2 | 53 | 5 | 42 | 5.5% | 0.32 [0.06, 1.55] | | | |
| | Xiaoke W 2023 | 5 | 88 | 0 | 88 | 1.8% | 11.00 [0.62, 195.98] | | | \rightarrow |
| | Xiaoke W 2023* | 4 | 88 | 4 | 88 | 7.3% | 1.00 [0.26, 3.87] | | | |
| | Total (95% CI) | | 835 | | 818 | 100.0% | 0.77 [0.52, 1.14] | | • | |
| | Total events | 67 | | 82 | | | | | | |
| | Heterogeneity: Tau ² = 0 | 0.08; Chi² = | = 9.56, c | f = 7 (P = | 0.22); l² | = 27% | | | | 100 |
| | Test for overall effect: Z | z = 1.32 (P | = 0.19) | | | | | 0.01 | Acupuncture Control group | 100 |

| ~ |
|---|
| |

| 5 | | Acupund | cture | Blank control | group | | Risk Ratio | | | Risk | Ratio |) | | |
|---|-------------------------------------|--------------------------|-----------|--------------------|----------|--------|--------------------|-----|-----|--------------------|--------|-----------------|-------|---|
| | Study or Subgroup | Events | Total | Events | Total | Weight | M-H, Random, 95% C | | | M-H, Rand | lom, 9 | 95% CI | | |
| | C. Smith 2002* | 11 | 146 | 18 | 143 | 39.7% | 0.60 [0.29, 1.22] | | | - | + | | | |
| | C. Smith 2002*** | 16 | 147 | 18 | 143 | 45.2% | 0.86 [0.46, 1.63] | | | | | | | |
| | Lihua J 2014 | 2 | 20 | 9 | 20 | 15.1% | 0.22 [0.05, 0.90] | ← | | | | | | |
| | Total (95% CI) | | 313 | | 306 | 100.0% | 0.61 [0.34, 1.10] | | | | + | | | |
| | Total events | 29 | | 45 | | | | | | | | | | |
| | Heterogeneity: Tau ² = 0 | 0.10; Chi ² : | = 3.10, c | If = 2 (P = 0.21); | l² = 36% |) | | | | | | - | + | |
| | Test for overall effect: 2 | Z = 1.64 (P | = 0.10) | | | | | 0.1 | 0.2 | 0.5 Acupuncture | Blar | ∠ nk control | group |) |

| C | | Acupun | cture | Sham acupuncture group | | | Risk Ratio | | Risk | Ratio | |
|---|-----------------------------------|------------------------|-----------|--|-------|--------|----------------------|------|--------------------|-------------|-------------------|
| | Study or Subgroup | Events | Total | Events | Total | Weight | M-H, Random, 95% C | | M-H, Rand | om, 95% Cl | |
| | C. Smith 2002 | 11 | 146 | 14 | 147 | 38.2% | 0.79 [0.37, 1.68] | | | | |
| | C. Smith 2002** | 16 | 147 | 14 | 147 | 45.6% | 1.14 [0.58, 2.26] | | | | |
| | Xiaoke W 2023 | 5 | 88 | 0 | 88 | 3.0% | 11.00 [0.62, 195.98] | | | | . → |
| | Xiaoke W 2023* | 4 | 88 | 4 | 88 | 13.2% | 1.00 [0.26, 3.87] | | | | |
| | Total (95% CI) | | 469 | | 470 | 100.0% | 1.05 [0.63, 1.73] | | | | |
| | Total events | 36 | | 32 | | | | | | | |
| | Heterogeneity: Tau ² = | 0.03; Chi ² | = 3.27, 0 | df = 3 (P = 0.35); l ² = 8% | 1 | | | | | | |
| | Test for overall effect: | Z = 0.17 (F | 9 = 0.86) | | | | | 0.05 | 0.2 Acupuncture | Sham acupun | 20 cture group |

| D | | Acupund | cture | Conventional | therapy | | Risk Ratio | | Risk | Ratio | |
|---|--|------------------------|-----------|--------------|---------|--------|---------------------|------|----------------------|-----------------------|--------------|
| | Study or Subgroup | Events | Total | Events | Total | Weight | M-H, Random, 95% CI | | M-H, Rand | om, 95% Cl | |
| | Ruying W 2008 | 2 | 53 | 5 | 42 | 100.0% | 0.32 [0.06, 1.55] | | | _ | |
| | Total (95% CI) | | 53 | | 42 | 100.0% | 0.32 [0.06, 1.55] | | | - | |
| | Total events | 2 | | 5 | | | | | | | |
| | Heterogeneity: Not app Test for overall effect: Z | licable Z = 1.42 (P | 9 = 0.16) | | | | | 0.01 | 0.1 1 Acupuncture | 10 Conventional th | 100 erapy |

| E | | Acupund | ture | Sham acupuncture gr | oup | | Risk Ratio | | Risk | Ratio | |
|---|---|---------|-------|---------------------|-------|--------|----------------------|------|-------------|------------------|-------|
| | Study or Subgroup | Events | Total | Events | Total | Weight | M-H, Random, 95% C | | M-H, Rand | om, 95% Cl | |
| | Knight B 2001 | 1 | 22 | 0 | 17 | 11.6% | 2.35 [0.10, 54.28] | | | • | |
| | Xiaoke W 2023 | 34 | 88 | 2 | 88 | 58.9% | 17.00 [4.21, 68.60] | | | | |
| | Xiaoke W 2023* | 27 | 88 | 1 | 88 | 29.4% | 27.00 [3.75, 194.37] | | | | |
| | Total (95% CI) | | 198 | | 193 | 100.0% | 15.47 [5.30, 45.16] | | | - | |
| | Total events | 62 | | 3 | | | | | | | |
| | Heterogeneity: Tau ² = 0.00; Chi ² = 1.76, df = 2 (P = 0.42); l ² = 0% Test for overall effect: Z = 5.01 (P < 0.00001) | | | | | | | | 01 | 10 | 100 |
| | | | | | | | | 0.01 | Acupuncture | Sham acupuncture | group |

Fig. 7. Forest plot of adverse events between acupuncture group and control group (A: severe adverse events between acupuncture group and control group; B: severe adverse events between acupuncture group and blank control group; C: severe adverse events between acupuncture group and sham acupuncture group; D: severe adverse events between acupuncture group and conventional therapy group; E: needling-related adverse events between acupuncture group).

comparing the ineffective rate between the acupuncture/moxibustion group and the control group (p = 0.002). As for the CMS, no significant publication bias is found in Fig. 9 (p = 0.620). The number of studies involving the PUQE scale and needle-related adverse events was limited. Hence, we only performed Egger's test and p-value was 0.009 and 0.488, respectively. The funnel plot and Egger's test could not be conducted in nausea scale which was evaluated in only two studies. In Fig. 10, it shows that there was no evident publication bias when comparing the incidence of severe adverse events (p = 0.971).

4. Discussion

This meta-analysis included several studies published in Chinese, selected through screening Chinese database. The aim of this study was to evaluate the efficacy and safety of acupuncture and moxibustion for the management of nausea and vomiting during early gestation in pregnant women. The main finding of our analysis suggested that acupuncture and moxibustion could effectively alleviate nausea and vomiting and were relatively safe treatment options for pregnant women. Nevertheless, there was a limited number of studies comparing the efficacy of moxibustion in treating nausea and vomiting. There was no significant difference in efficacy between the acupuncture and the sham acupuncture group. Similar results were observed between the acupuncture combined with moxibustion group and the acupoints injection group. The pooled analysis of various scales yielded substantially consistent results, except for the nausea scale, which may because by the limited number of studies and significant heterogeneity. In terms of adverse events, there was no significant discrepancy in severe adverse events between the acupuncture group. However, the incidence rate of needle-related adverse events was higher in the acupuncture group compared with the sham acupuncture group. No studies reported adverse events associated with moxibustion in our meta-analysis.

In previous studies, the pathogenesis of NVP had been unclear. The historical hypothesis included hormonal factors, Helicobacter pylori, gastrointestinal dysmotility, placenta-related factors, psychosocial factors, and genetics [32]. Generally, ginger, pyridoxine, antihistamines, metoclopramide, promethazine, ondansetron, and corticosteroids may improve symptom [33]. In addition to conventional approaches like fluid replacement, electrolyte balance, and antiemetic agents, there have also been studies exploring complementary and alternative treatments for NVP. Notably, the effectiveness of acupuncture for NVP has yielded inconsistent results across different studies [34]. In traditional Chinese medicine, NVP is believed to be primarily caused by the upward flow of excessive qi in the Chong Channel when the blood descends to nourish the fetus. This imbalance results in the inability of the stomach qi to descend, leading to nausea and vomiting [35]. Therefore, acupuncture or moxibustion on specific acupoints, which aim to strengthen the spleen and regulate qi, theoretically alleviate nausea and vomiting. In previous studies, however, the effect of acupuncture and moxibustion was inconsistent [36–39]. In our meta-analysis, we found that acupuncture was effective in managing NVP when compared with the Chinese traditional herbs, conventional therapy, and blank control groups. In a meta-analysis conducted in patients with chronic nonspecific low back pain [40], researchers found that sham acupuncture was not a true placebo control and might underestimate the efficacy of acupuncture. In our subset analysis comparing acupuncture and sham acupuncture revealed significant heterogeneity ($I^2 =$ 69 %). All data was from the studies conducted by D. Habek in 2004 and Knight B in 2001. The results of these two studies present a paradoxical scenario, and the sample size was limited. These reasons could explain why there was no significant difference between the sham acupuncture groups and the acupuncture groups in our research. As for moxibustion, it was effective when compared with the blank control groups. Pregnant women who received acupuncture combined with moxibustion experienced reduced nausea and vomiting comparing to the control group, while the efficacy was like the acupoints injection group.

According to a systematic review that included 25 studies, the incidence of adverse events during pregnancy evaluated as certainly, probably or possibly causally related to acupuncture was 1.3 % [41]. Needling pain was the most frequent and all severe adverse events were considered unlikely to have been caused by acupuncture [41]. Compared with non-acupuncture-related intervention during pregnancy, adverse events seemed to be mostly minor [42]. A cohort study involving 20,799 pregnant women found no significant difference in the incidence of preterm delivery and stillbirth between the acupuncture group and the control group [43]. Additionally, a RCT with 278 patients suffering from postprandial distress syndrome reported that all adverse events were mild and self-limiting



Fig. 8. Funnel plot for ineffective rate between acupuncture/moxibustion group and control group.



Fig. 9. Funnel plot for Chinese medicine syndrome score scale.



Fig. 10. Funnel plot for the incidence of severe adverse events.

[44]. In our study, we compared the incidence of severe adverse events between the acupuncture group and the control group, which included the blank control group, the conventional therapy group, and the sham acupuncture group. We observed that there was no significant difference in the incidence of severe adverse events between the experimental group and control groups. However, we did observe a higher frequency of needling-related adverse events in the acupuncture group compared with the sham acupuncture group. Similarly, in patients with episodic migraines, researchers found that the incidence of acupuncture-related adverse events, such as bleeding, subcutaneous hemorrhage, severe pain, palpitations, fainting, and local infection, was higher in the acupuncture group compared with the sham acupuncture group (8 % vs. 0 %) [45]. Hence, based on our findings, acupuncture was a relatively safe treatment option with few severe adverse events reported. However, it is unclear why there was a higher incidence of needling-related adverse events in the acupuncture group. It is important to note that this data was primarily derived from Xiaoke Wu's research in our meta-analysis. Thus, further clinical studies focusing on the incidence of

needling-related adverse events are necessary to gain a more comprehensive understanding. Moxibustion had the potential risk of allergy, burn and infection [46]. In a RCT performed in prehypertension and stage I hypertension, the most frequent adverse events of acupuncture were blistering [47]. In our study, there was no RCT reported moxibustion-related adverse events among early pregnant women for alleviating nausea and vomiting.

There are several limitations in our meta-analysis. Firstly, heterogeneity observed among the included studies, which may affect the interpretation of the results. In certain subgroup analysis, the I^2 value exceeded 50 %. Variations in population characteristics, different acupoints, and outcome measures may contribute to the observed heterogeneity. Secondly, the possibility of publication bias must be considered. Studies with negative or insignificant results might not be published and less likely to be included in our analysis. It might introduce a bias in favor of positive outcomes. Thirdly, the potential confounding variables in the original studies might impact the validity of the results, such as different acupoints selection. Thus, long-term cohort studies and randomized control trials are required to confirm the efficacy and safety of acupuncture and moxibustion in early pregnant women.

5. Conclusion

Acupuncture and moxibustion might be effective for the management of nausea and vomiting in early pregnant women. Acupuncture might be a relatively safe treatment option for NVP, as there was no observed increase in severe adverse events. However, needling-related adverse events might go up. The safety of moxibustion was not be assessed due to the limited availability of relevant RCTs.

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Data will be made available on request.

CRediT authorship contribution statement

Yao Hu: Writing – original draft, Methodology, Data curation. **Qian Yang:** Writing – original draft, Methodology, Data curation. **Xianjin Hu:** Writing – review & editing, Supervision, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e24439.

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