Original Article

Acupuncture in the Prevention of Chemotherapy-induced Nausea and Vomiting: A Meta-analysis of Randomized Controlled Studies

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Abstract

Background and Aims: Chemotherapy-induced nausea and vomiting (CINV) are both common clinical problems in cancer patients. As a traditional Chinese medicine treatment method, acupuncture has a remarkable healing effect on the treatment of nausea and vomiting, but a systematic meta-analysis is lacking concerning this topic.

Methods: This paper searched the randomized controlled clinical trial literature on acupuncture for the prevention of CINV in the Pubmed, EMBASE, CNKI, WF (WAFANG DATE), Cochrane, and VIP (CQVIP) databases with a search date of October 20, 2021. An independent quality evaluation and effect size extraction of the literature were performed by two researchers, and the meta-analysis and quality evaluation of all the literature was performed using RevMan 5.4. A total of 18 publications meeting the criteria were screened for the meta-analysis with a total of 1,135 patients.

Results: Combined acupuncture prophylaxis was significantly better than other chemotherapy regimens in comparison with conventional chemotherapy regimens (risk ratio (RR) = 1.29; 95% confidence interval (CI): 1.17–1.43, $p < 0.00001$; odds ratio (OR) = 3.61; 95% CI: 2.19–5.96, $p < 0.00001$). Combined acupuncture was also effective in the prevention of side effects, such as loss of appetite (RR = 0.64; 95% CI:0.42–0.97, $p < 0.00001$; OR = 0.52; 95% CI:0.28–0.96, $p = 0.04$), constipation (RR = 0.57; 95% CI :0.44–0.73, $p < 0.00001$; OR = 0.30; 95% CI:0.18–0.51, $p < 0.00001$), and diarrhea (RR = 0.58; 95% CI:0.39–0.86, $p < 0.00001$; OR = 0.31; 95% CI:0.13–0.72, $p < 0.00001$).

Conclusions: Acupuncture prevention could reduce the incidence of CINV which has certain research value and thus would be worthy of research trials and clinical application.

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Introduction

Chemotherapy is one of the most effective treatments for malignant tumors. Chemotherapy-induced nausea and vomiting (CINV) refers to the symptoms of nausea and vomiting in patients who are diagnosed with malignant tumors after the use of chemotherapy drugs or chemotherapy-related drugs in the period of chemotherapy. However, CINV is the most common adverse reaction during chemotherapy, which occurs with an incidence of over 80%.[1] Moreover, cisplatin causes 100% incidence of nausea and vomiting, which seriously affects the quality of the patients' survival and reduces the patients' adherence.[2] In severe cases, this could lead to nutritional deficiencies and water-electrolyte imbalance.[3] This would make the patients' body resistant to chemotherapy, which would be detrimental to tumor control and the patients' health. Therefore, the effective prevention of CINV would be of great significance to patients with malignant tumors. Although Western

medicine has shown certain advantages in the treatment of CINV, it is less ideal in controlling some specific types of CINV and has certain side effects, such as nausea and vomiting, bone marrow suppression, oral mucosal toxicity, allergic reactions, hair loss, ototoxicity, and nephrotoxicity.

Acupuncture has been used for thousands of years to treat this type of disease and has accumulated a great deal of clinical experience. Furthermore, Chinese medicine contains unique and distinctive insights into CINV, and as a result, holds irreplaceable integral advantages over the treatment of CINV. In addition, the year 1997 witnessed the first announcement by the National Institutes of Health, USA that acupuncture could effectively treat CINV.[4] In 2002, the World Health Organization (WHO) recommended the use of acupuncture for the treatment of 77 conditions, including adverse effects associated with chemotherapy and radiotherapy.[5,6] Then in 2014, the Chinese Guidelines for the Prevention and Treatment of Oncology-Related Vomiting incorporated the combination of Chinese medicine for CINV into the treatment protocol for this condition.[7] Following this, in 2016, US experts noted recommendations for increased research into the efficacy management and mechanisms of symptoms associated with acupuncture for malignancy,[8] as acupuncture had played an increasingly important role in the treatment of CINV. As part of traditional Chinese medicine treatment, acupuncture has the advantage of being simple, inexpensive, and most importantly, effective in the prevention and treatment of nausea and vomiting. As a result, this study collected randomized controlled studies of acupuncture therapy for the prevention of CINV for quality evaluation and a meta-analysis in order to provide an evidence-based basis for the prevention of CINV with acupuncture.

Material and methods

The review is registered with PROSPERO.[9] The registration number is CRD42021285713.

Inclusion Criteria

1. Study design: The original literature was published, and the study method was a randomized controlled trial with no restrictions on the language of the publications.
2. Study population: Patients who were diagnosed with a malignant tumor and were undergoing chemotherapy with no nausea and vomiting during this chemotherapy.
3. Treatment: The treatment group was treated with acupuncture based on the control group. The control group was receiving a conventional chemotherapy regimen or Western medicine for prophylaxis.
4. Outcome assessment: The included literature had clear efficacy evaluation criteria, which set the rates of nausea and vomiting as the primary outcome indicator. In addition to the nausea and vomiting rates, the number of people with diarrhea, the number of people with loss of appetite, and those with a Karnofsky (KPS) score were also identified as outcome indicators.

Exclusion Criteria

1. Duplicate publication or duplicate detection of the literature.
2. Too few cases were included (less than 10).
3. Full text was not available.
4. Allergies or combined with serious primary diseases, such as cardiovascular, cerebrovascular, hepatic, renal, and hematopoietic system, patients with diabetes mellitus, psychiatric disorders, and infectious diseases.

Search Strategy

A computerized search of six databases, Pubmed, EMBASE, Cochrane, and CNKI, VIP, WF, was conducted to identify studies that reported randomized clinical trials (RCTs) of acupuncture for tumor-related nausea and vomiting. Chinese search terms included 'acupuncture', 'needling', 'chemotherapy', 'nausea and vomiting', 'and randomised controlled trial'. The English search formula was 'acupuncture'/exp AND 'chemotherapy'/exp AND 'postoperative nausea and vomiting'/exp. Based on the characteristics of the different databases, a comprehensive search was conducted on the characteristics. The literature related to 'randomized control' and 'randomized grouping' was then screened.

Selection of the materials

The results of the literature search were imported into Endnote according to the design protocol. Any duplicates were removed, and all study components were completed independently by two reviewers since they started doing the literature search. Any discrepancies between the two reviewers were resolved by discussing and tracing the original studies according to the above inclusion and exclusion criteria.

Research quality assessment

The quality of the included literature was assessed applying the Cochrane risk of bias tool for studies. The evaluation covered random sequence generation, allocation concealment, blinding of participants and personnel, blinding of the outcome assessment, incomplete outcome data and exclusions, selective reporting, and other sources of bias. Each item was categorized as 'high risk', 'low risk', or 'unclear'. Two reviewers conducted the quality checks independently with a third researcher involved in negotiating when disagreements were encountered, and the final risk of the bias assessment map was generated by RevMan 5.4 software.

Data analyses

The meta results were analyzed using RevMan 5.4 software. The reference data for the dichotomous variables were provided in the form of relative risk ratios (RR) and their 95% confidence intervals (CI), and χ^2 tests for heterogeneity between studies. If $p > 0.1$ $I^2 \leq$ 50%, this indicated good homogeneity and a fixed-effects model was available. If $p \leq 0.1$; $I^2 > 50\%$, this showed large heterogeneity; thus, subgroup analysis or sensitivity analysis was required to analyze the source of heterogeneity. If the source of heterogeneity still could not be identified, then a random effect model was selected. A funnel plot analysis was also used to analyze the publication bias.

Results

Inclusion in the study screening process

The initial search identified 520 references. After removing 161 duplicates, 331 references were filtered by examining their titles, abstracts, and keywords. After the first level of screening, 28 full-text articles were read through. Finally, 10 studies were excluded, and the remaining 18 studies were included in the review.[10–27] In the 18 included studies, the sample sizes involved ranged from 30 to 120 with a total of 563 cases in the treatment group and 572 in the control group, which were all patients with or without post-chemotherapy nausea and vomiting. The process of the search, screening, and selection for the study is shown in Figure 1.
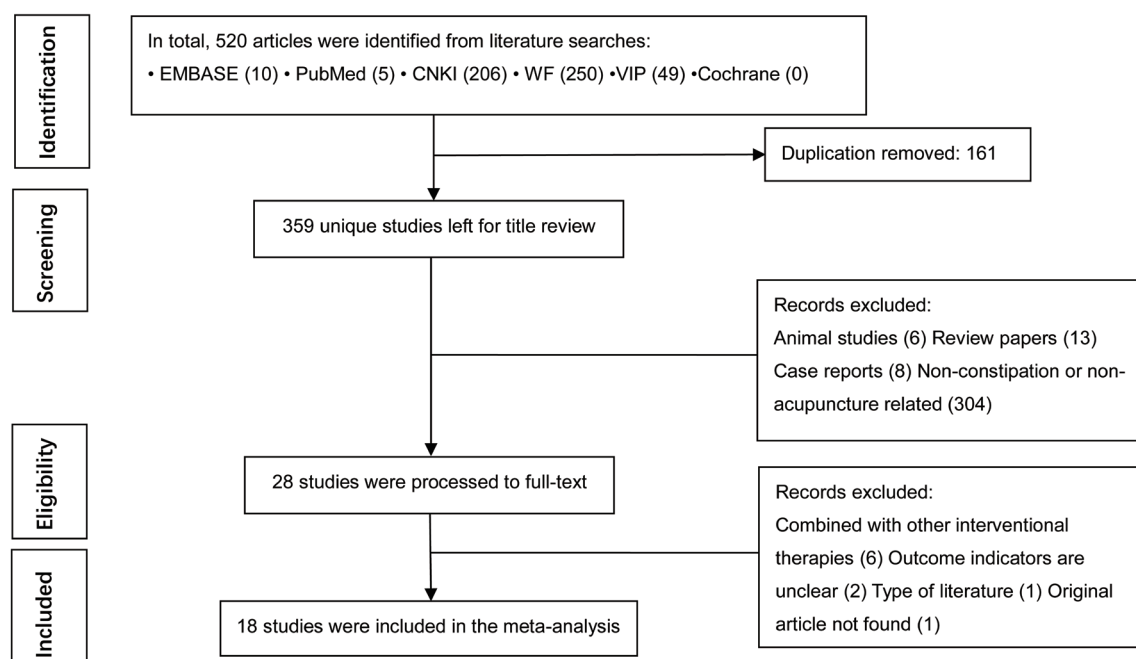
Fig. 1. The screening process. WF, WAFANG DATE; VIP, CQVIP.

Basic information for inclusion in the article

The basic information included in the articles is shown in Table 1. [10–27]

Documentation characteristics statistics

A total of 18 articles were included comprising two in English[10,11] and 16 in Chinese[12–27] of which 10 were published in the past five years,[11,12,14,17,22–27] six published in 2010–2016,[10,15,18–21] and one article published before 2010.[13] A total of 48 acupoints were selected from the 18 articles, of which the most frequently used was the Zusanli acupoint (ST36) with 563 times of adoption, accounting for 82.11% of the total, followed by the Neiguan acupoint (PC6) with 504 times, accounting for 44.40% of the total, and the third was the Zhongwan acupoint (CV12) with 270 times, accounting for 23.78% of the total, respectively. The remaining acupoints were used no more than 10 times. Of the tumors studied in the article, two were breast cancer, three were lung cancer, one was a lymphoma, one was a multiple myeloma patient, and 11 were multiple malignancy patients.

Risk of bias

Of the random sequence generation, seven mentioned random number tables; three mentioned random envelopes, four mentioned random controls, and four mentioned randomizations. Of the allocation concealments, one mentioned the complete concealment method and the rest did not. Of those blinded to the investigators and implementers, six were noted to be single-blind and the remainder were not. Of the completeness of the outcome data, six articles noted shedding, and the remainder did not. The Cochrane risk of bias assessment for the included articles is presented in Figure 2. The results showed a high risk of bias in four trials, a moderate risk of bias in 13 trials, and a low risk of bias in one trial. The high risk of bias was due to the lack of blinding to the participants, personnel, and outcome assessors, no mention of allocation concealment, and lack of rigor in the random sequence generation.

The lack of blinding to the outcome assessors and no mention of allocation concealment resulted in a medium risk, and the lack of blinding for the outcome assessors resulted in a low risk (Fig. 2).

Meta-analysis results

Total effective rate

Seven studies reported the effectiveness of CINV after acupuncture.[10,12–14,16,19,25] Of the 234 cases in the treatment group, 200 were effective, whereas of the 234 cases in the control group, 177 were effective (See Supplementary Table 1). The meta-analysis of the heterogeneity tests showed $\chi^2 = 6.56$, $p = 0.36$, and $I^2 = 9\%$ with no significant differences between the studies, thus allowing for a fixed-effects model. The effective rate of treating nausea and vomiting was higher in the treatment group than in the control group, which had a statistically significant difference (n = 468, RR = 1.29; 95% CI:1.17–1.43, $p < 0.00001$; OR = 3.61; 95%CI:2.19–5.96, $p < 0.00001$; Fig. 3a).

Nausea rates

Eleven studies reported the number of nausea cases after acupuncture.[11–13,15,17,20–22,24–26] Of the 353 cases in the treatment group, 283 were nausea-free, whereas of the 354 cases in the control group, 213 were nausea-free (See Supplementary Table 1). The heterogeneity tests in the meta-analysis showed $\chi^2 = 12.07$, $p = 0.28$, and $I^2 = 17\%$ with no significant differences between the studies, thus allowing for a fixed-effects model. The rate of nausea-free was higher in the treatment group than in the control group, and the difference was statistically significant (n = 707, RR = 1.33; 95% CI:1.20–1.46, $p < 0.00001$; OR = 2.84; 95% CI:1.99–4.04, $p < 0.00001$; Fig. 3b).

Vomiting rates

Ten studies reported the number of vomiting cases after acupunc-

Table 1. Basic information about the article

Study authors and year	Tumor type	T	C	Chemotherapy regimens	Acupuncture points	Intervention
Ling-Ling Wang 2020[17]	Breast cancer	31	30	EC-T program	PC6, CV12, ST36, ST21, and matching time and space acupoints	Acupuncture + (5-HT)5-hydroxytryptamine receptor antagonist
Jing Xuan 2020[25]	Non-small cell lung cancer	30	30	GP program	Stomachache acupoint, PC6	Acupuncture + 5-HT
Tai Liu 2020[22]	Multiple malignant tumors	33	33	Regular program	ST36, PC6, CV17, Co21	Acupuncture + 5-HT
Qi Guo 2020[26]	Multiple malignant tumors	32	32	Regular program	ST36, PC6, CV12, SP4, ST25, CV6, RN4	Acupuncture + 5-HT
Meng-Jun Dan 2020[12]	Adenocarcinoma of the lung	37	36	AP DP TP program	Heart 1, 2, and 3 acupoints and the upper and lower Mars acupoints	Acupuncture + 5-HT
Yun Yang 2019[27]	Multiple malignant tumors	28	30	Cisplatin program	ST36	Acupuncture + 5-HT
Rui Gao 2019[14]	Lymphoma	41	41	Regular program	CV1, Shuifen Acupoint, RN4, CV6, ST25, Daheng Acupoint, ST36	Acupuncture + 5-HT
Lei Chen 2017[24]	Multiple myeloma	21	23	Regular program	ST36, CV12, PC6, ST40	Acupuncture + 5-HT
Yin Xu 2016[16]	Multiple malignant tumors	22	22	Cisplatin program	CV12, CV13, CV10, CV6, ST25, ST36, PC6, Baihui Acupoint, shenting Acupoint, yintang Acupoint	Acupuncture + 5-HT
Wei-Qi Li2016[20]	Lung, breast, or gynecological cancers	27	30	Regular program	ST36, PC6, CV12, LR13, ST25, CV6	Acupuncture + 5-HT
Ji-Bin Chen 2016[19]	Lung Cancer	29	30	EP program	ST36, ST25, CV12, PC6	Acupuncture + 5-HT
Jin-Sheng Lv 2012[18]	Multiple malignant tumors	25	30	Cisplatin program	ST36, PC6, CV12	Acupuncture + 5-HT
Ye-Ke Li 2012[21]	Breast cancer	32	32	ACT program	ST36	Acupuncture + 5-HT
Li Ding 2011[15]	Multiple malignant tumors	13	15	Cisplatin program	CV13, CV12, CV10, CV6, ST25, ST36, PC6	Acupuncture + 5-HT
Kulthida Rith2015[10]	Gynecological cancer	35	35	Paclitaxel and carboplatin program	PC6	Acupuncture + 5-HT
Qi-Wei Li2020[11]	Lung, breast or gynecological cancers	62	58	Cisplatin, anthracycline, or paclitaxel regimens	ST36, PC6, CV12, LR13, CV6, ST25	Acupuncture + 5-HT
Qiang Fu 2003[13]	Leukemia, lymphoma, myeloma	40	40	DA, HOAP, VDLP, CHOP program	ST36, PC6	Acupuncture + 5-HT
Jing-Ting Xu 2020[23]	Multiple malignant tumors	25	25	Cisplatin program	ST36, PC6, SP4, SP3, HT7	Acupuncture + 5-HT

Co21, Xuanji acupoint; CV6, Qihai acupoint; CV10, Xiawan acupoint; CV12, Zhongwan acupoint; CV13, Shangwan acupoint; CV17, Danzhong acupoint; HT7, Shenmen acupoint. KPS, Karnofsky Performance Scale; LR13, Zhangmen acupoint; PC6, Neiguan acupoint; RN4, Guanyuan acupoint; SP4, Gongsun acupoint; ST21, Liangmen acupoint; ST25, Tianshu acupoint; ST36, Zusanli acupoint; ST40, Fenglong acupoint.

ture.[11,13,15,17,20,22,24–27] Of the 312 cases in the treatment group, 271 were vomit-free, whereas of the 314 cases in the control group, 208 were vomit-free (See Supplementary Table 1). The heterogeneity tests in the meta-analysis showed $\chi^2 = 15.41$, $p = 0.08$, and $I^2 = 42\%$ with no significant differences between the studies, hence allowing for a fixed-effects model. The vomiting-free rate was higher in the treatment group than in the control group, and the difference was statistically significant (n = 626, RR = 1.30;95% CI:1.20–1.42, $p < 0.00001$; OR = 4.06; 95% CI:2.59–6.35, $p < 0.00001$; Fig. 3c).

Diarrhea

Three studies reported the number of diarrhea cases after acupunc-

Fig. 2. Risk of the bias analysis. Red (High risk), yellow (Standard risk), green (Low risk).

ture.[16,21,23] Of the 79 cases in the treatment group, 19 had diarrhea, whereas of the 79 cases in the control group, 33 had diarrhea (See Supplementary Table 1). The heterogeneity test in the meta-analysis showed $\chi^2 = 0.56$, $p = 0.76$, and $I^2 = 0\%$ with no significant differences between the studies, thus allowing for a fixed-effects

model. The number of diarrhea cases in the treatment group was lower than in the control group, and the difference was statistically significant (n = 168, RR = 0.58; 95% CI:0.39–0.86, $p < 0.00001$; OR = 0.31; 95% CI:0.13–0.72, $p < 0.00001$; Fig. 4a).

Constipation

Six studies reported the number of people constipated after acupuncture.[10,13,16,18,21,24] Of the 180 cases in the treatment group, 47 had constipation, whereas of the 182 cases in the control group, 85 had constipation (See Supplementary Table 1). The heterogeneity tests in the meta-analysis showed $\chi^2 = 4.71$, $p = 0.45$, and $I^2 = 0\%$ with no significant differences between the studies, thus allowing for a fixed-effects model. The number of constipation cases was lower in the treatment group than in the control group, and the difference was statistically significant (n = 362, RR = 0.57; 95% CI:0.44–0.73, $p < 0.00001$; OR = 0.30; 95% CI:0.18–0.51, $p < 0.00001$; Fig. 4b).

Appetite loss

Five studies reported on the number of cases of loss of appetite after acupuncture.[10,16,18,21,24] Of the 140 cases in the treatment group, 24 experienced loss of appetite, whereas of the 142 cases in the control group, 39 experienced loss of appetite (See Supplementary Table 1). The heterogeneity test in the meta-analysis showed $\chi^2 = 1.63$, $p = 0.80$, and $I^2 = 0\%$ with no significant differences between the studies, thus allowing for a fixed-effects model. The number of cases of loss of appetite was lower in the treatment group than in the control group, and the difference was statistically significant (n = 282, RR = 0.64; 95% CI:0.42–0.97, $p < 0.00001$; OR = 0.52; 95% CI:0.28–0.96, $p = 0.04$; Fig. 4c).

Karnofsky performance scale (KPS) score

Six studies reported on post-needling Karnofsky Performance Scale (KPS) scores.[17–19,22,23,26] Overall, there were 180 cases in the treatment group and 180 in the control group. The meta-analysis of the heterogeneity tests showed that the differences between the studies were statistically significant with $\chi^2 = 24.89$, $p = 0.00001$, and $I^2 = 80\%$, hence allowing for a random-effects model. The difference was statistically significant in the treatment group with a lower KPS score than the control group (n = 360, standardized mean difference = 7.12, 95% CI:3.35–10.88, Z = 3.71, $p = 0.0002$; Fig. 4d).

Subgroup analysis

Chemotherapy regimen subgroup analysis: A meta-analysis of seven studies of the chemotherapeutic drug subgroups comprised 234 cases in the trial group and 234 cases in the control group.[10,12–14,16,19,25] The test of heterogeneity ($p = 0.75$; $I^2 = 0\%$) indicated that there was no significant difference between the groups, and a fixed-effects model was used for the meta-analysis. The subgroup analysis was performed by different chemotherapy regimens. The groups were classified as the acupuncture group with cisplatin chemotherapy regimen, and the acupuncture group with conventional chemotherapy regimen (Fig. 5). In the cisplatin chemotherapy regimen group, the conventional chemotherapy regimen group showed a better antiemetic effect in the treatment group than in the control group. The conventional chemotherapy regimen group ($p = 0.0009$) and the cisplatin regimen group ($p = 0.0001$) resulted in $p < 0.05$ for the two groups, and the difference was statistically significant. The specific results are shown in Figure 5.

Cancer subgroup analysis: A meta-analysis of seven studies of the chemotherapeutic drug subgroups consisted of 234 cases in the
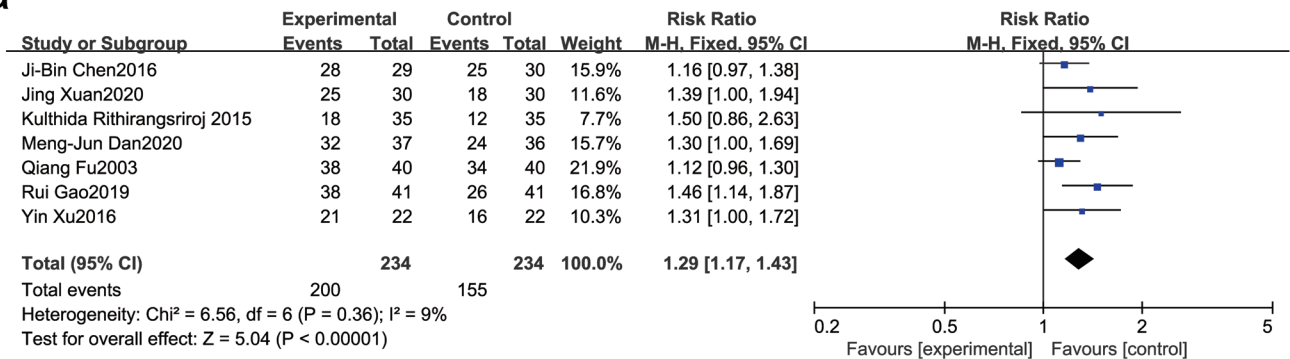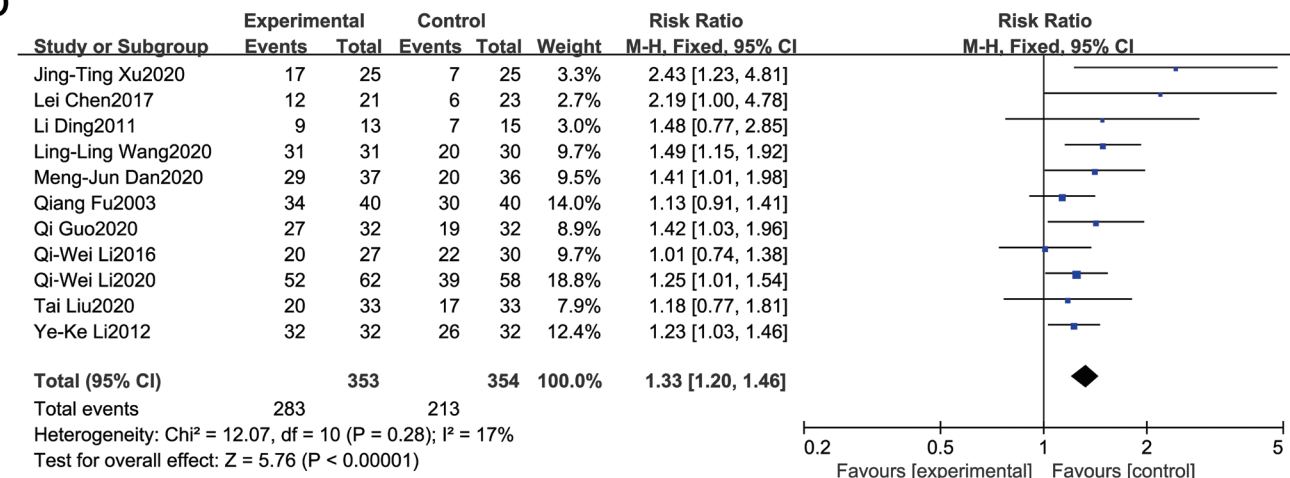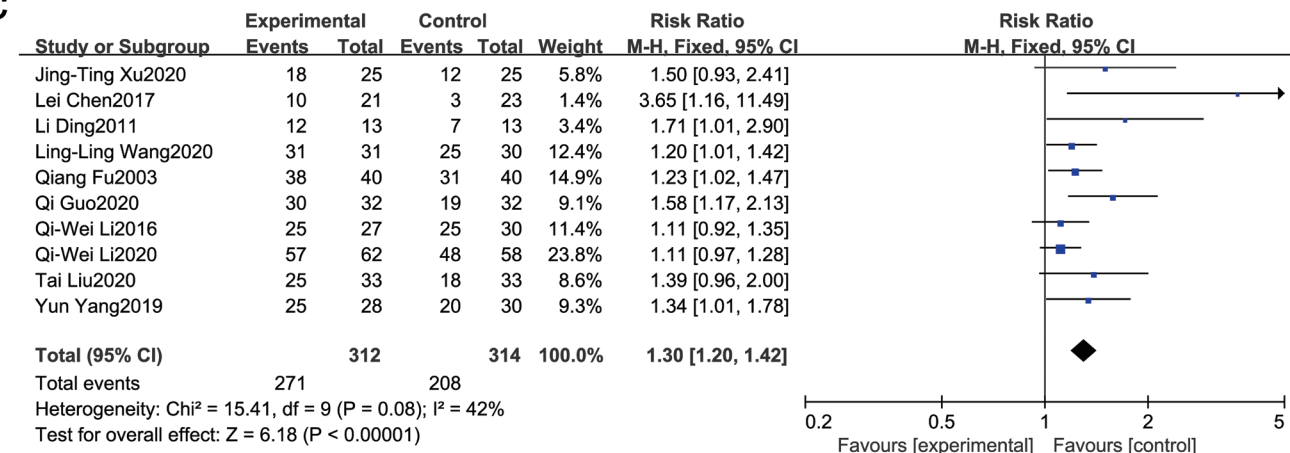
Fig. 3. Meta-analysis of the clinical efficiency, nausea rate, and vomiting rate. (a) Clinical efficiency meta-analysis; (b) nausea rate meta-analysis; (c) vomit rate meta-analysis. CI, confidence interval.

test group and 234 cases in the control group.[10,12–14,16,19,25] The test of heterogeneity ($p = 0.54$; $I^2 = 0\%$) showed that there was no significant difference between the groups. and a fixed-effects model was used for the meta-analysis. The subgroup analysis was performed by different chemotherapy regimens. They were divided into the multiple malignancies group, lung cancer group, and lymphoma cancer group (Fig. 6). The multiple malignancies,

lung cancer, and lymphoma cancer showed that the antiemetic effect of the treatment group was better than that of the control group. The antiemetic effect in the multiple malignancies group ($p = 0.0008$), lung cancer group ($p = 0.001$), and lymphoma group ($p = 0.003$) resulted in $p < 0.05$ for the three groups, and the difference was statistically significant. The specific results are shown in Figure 6.
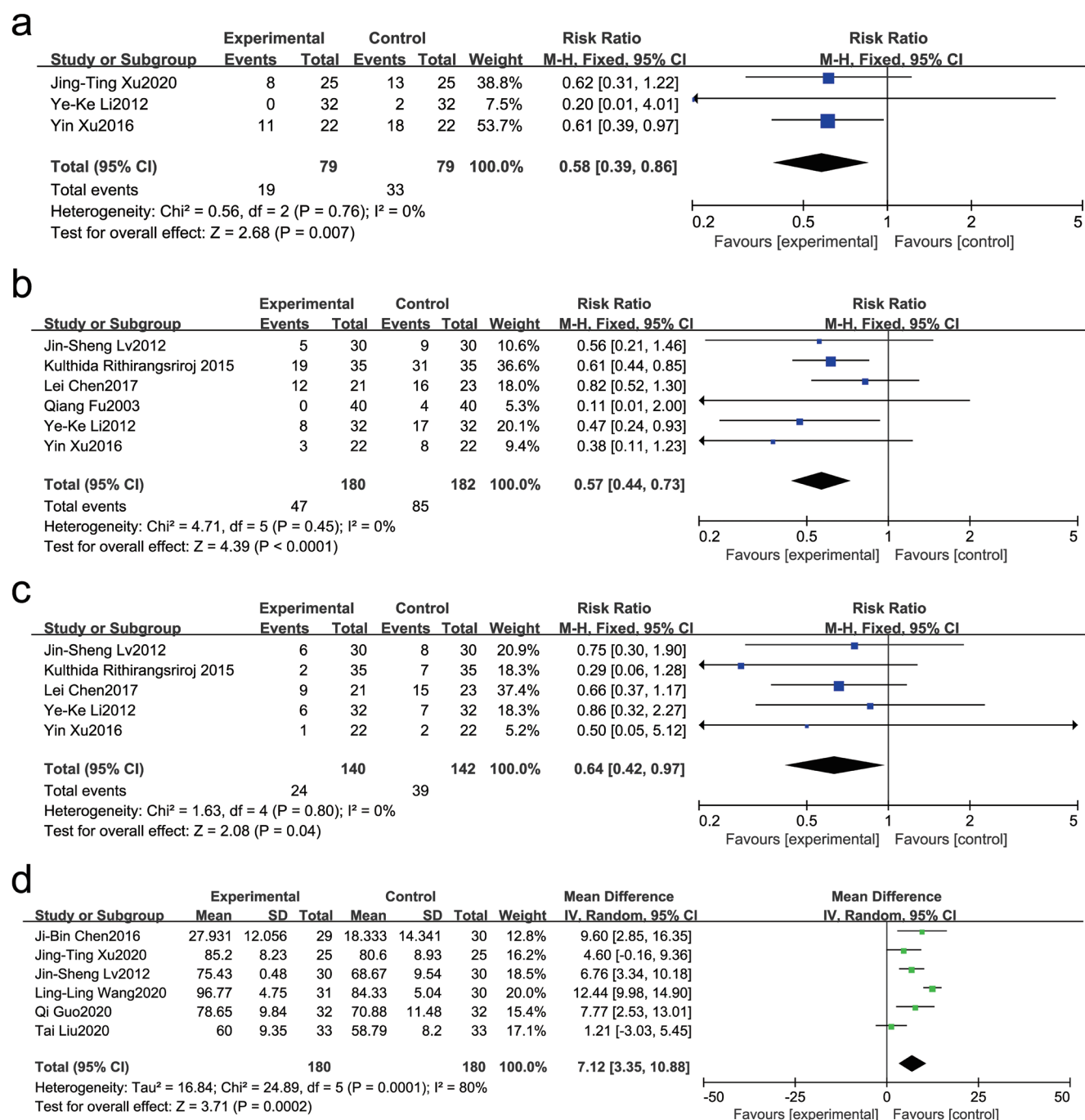
Fig. 4. Meta-analysis of diarrhea, constipation, appetite loss, and KPS. (a) meta-analysis of the number of people with diarrhea; (b) meta-analysis of the number of people with constipation; (c) meta-analysis of the number of people with appetite loss; (d) meta-analysis of the number of people with a KPS score. CI, confidence interval; KPS, Karnofsky Performance Scale.

Analysis of publication bias

Eleven publications included in the study were analyzed by applying RevMan 5.4 software.[11–13,15,17,20–22,24–26] From the funnel plot analysis, it could be seen that the publications were concentrated, not located on either side of the funnel plot, and not symmetrically distributed. This suggested the existence of some publication bias, which could be related to the low quality of the included studies.

The results are shown in Figure 7.

Discussion

The traditional Chinese medicine name for CINV corresponds to "vomiting", and the basic pathogenesis is the loss of harmony and of the stomach and the upward rebellion of gastric energy. Therefore,
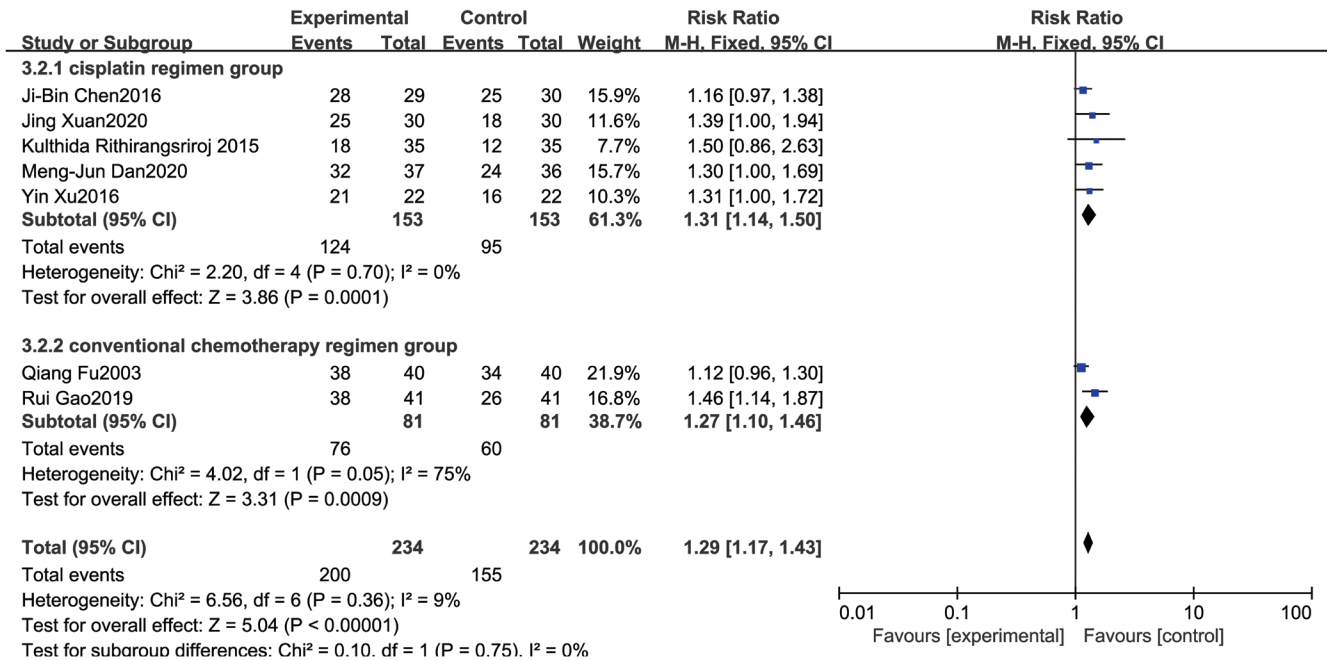
Fig. 5. Subgroup analysis of the chemotherapy regimens. CI, confidence interval.

the principle of the treatment is to regulate the elevation of the spleen and stomach, harmonize the stomach, and subdue the rebellion to stop vomiting. In the treatment of nausea and vomiting, the stomach

meridian, pericardium meridian, and Ren meridian are the preferred meridians, and ST36, PC6, and CV12 are the commonly used acupoints.[28] This is also the lower acupoint of the stomach, which has the
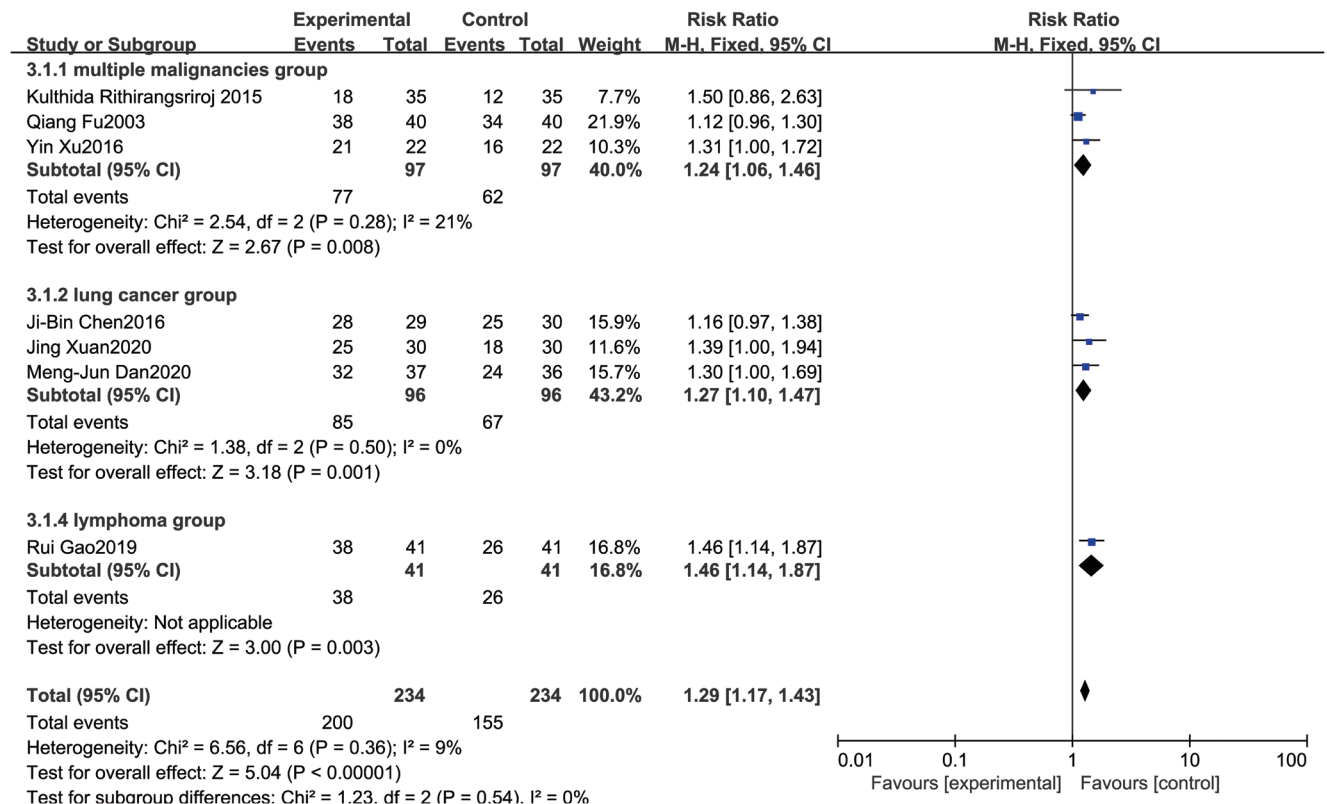

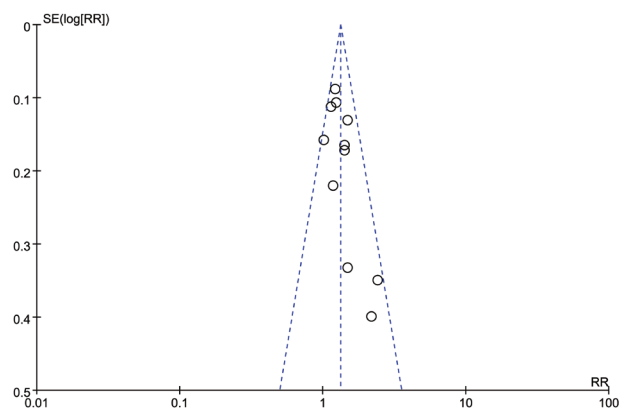**Fig. 6. Subgroup analysis of cancer.** CI, confidence interval.

Fig. 7. Publication bias analysis. RR, risk ratio.

function of regulating internal Qi, lowering rebelliousness and stopping vomiting, and tonifying stomach Qi; PC6 is a ligament acupoint of the Hand Convulsive Yin Pericardium meridian, which is connected to the Hand Shaoyang Sanjiao meridian, and can communicate with both the surface and the interior meridians, unblocking the Sanjiao Qi, and is responsible for broadening the chest and regulating Qi, lowering rebelliousness and stopping vomiting.[29] In addition, it is one of the eight rendezvous acupoints with the "Gong Sun Chong pulse of the stomach and heart and chest". CV12, belonging to the Ren Vessel, is a meeting of the Ren Vessel, the Hand Sun and Shao Yang, and the Foot Yang Ming. It is a recruitment acupoint for the stomach and the meeting of the internal organs of the eight Hui acupoints. It has the effect of harmonizing the stomach and strengthening the spleen, lowering the rebellion, and inducing diuresis. Modern research has found that ST36 can regulate the function of the intestinal tract movement.[30] It also has the effect of increasing the serum levels of gastrin and decreasing the levels of vasoactive peptides.[31] PC6 can prevent nausea and vomiting by the mechanism of reducing the 5-hydroxytryptamine concentrations in the plasma and intestinal tissues.[32] Modern research has also found that acupuncture at CV12 enhances gastrointestinal peristalsis, promotes the secretion of digestive juices, and accelerates gastrointestinal blood circulation.[33] In summary, all three acupoints can treat tumor-related nausea and vomiting.

Limitations of this study: 1) It was difficult to conduct double- or triple blinding considering the specificity of the acupuncture therapy. 2) It was difficult to form standardized treatment due to the different degrees of mastery of the acupuncture theory and different acupuncture acupoints by the acupuncture practitioners. 3) The evaluation of the efficiency of nausea and vomiting was subjective and lacked objective evaluation. 4) Some of the literature included small samples. 5) Most of the adverse effects and follow-up results were not reported.

Future directions

In the future, we will conduct research on acupuncture in the treatment of CINV, further refine the inclusion and exclusion criteria, and include sufficient large samples and multicenter randomized controlled trials, so that the outcome indicators would be more objective and comprehensive, and more acupoints would be mined.

Conclusions

Based on the available literature, it could be tentatively concluded that acupuncture prevention could reduce the incidence of CINV, which had some value and some improvement in other concomitant symptoms of chemotherapy and gastrointestinal reactions. Furthermore, acupuncture could better improve the CINV patients' karst score and improve their quality of life; thus, it would be worth in research experiments and clinical promotion. The main acupoints for the treatment of CINV were ST36, PC6, and CV12.

Outlook: Given the limitations of these studies, future RCTs studies should confirm the efficacy and safety of acupuncture for CINV. The following aspects would therefore need to be taken into account when designing clinical RCTs: 1. conducting high-quality, large-sample, multicenter randomized controlled trials with objective outcome indicators, uniform and consistent assessment criteria, and standardized protocol design; 2. blinding the data statisticians and report analysts; 3. documenting the follow-up and reporting the adverse effects; 4. conducting studies based on the Consolidated Standards of Reporting Trials and the Standards for Reporting Trials and Standards for Reporting in Clinical Trials of Interventions Acupuncture; 5. report on the details of the acupuncture, such as the depth of the insertion of the needle, the technique used to insert the needle, how long the needle lasts, duration of the acupuncture sessions, the qualifications of the acupuncturist, and years of clinical practice.

Conflict of interest

The author reports no conflicts of interest in this work.

Author contributions

DHL, JNZ, and HFF designed the research, prepared the data, wrote and revised the manuscript; XKL, JL, NG, ZHD, and HNW collected the data and translated the manuscript. The final manuscript was read and approved by all authors.

Data sharing statement

The data used to support the findings of this study are available from the corresponding author upon request.

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